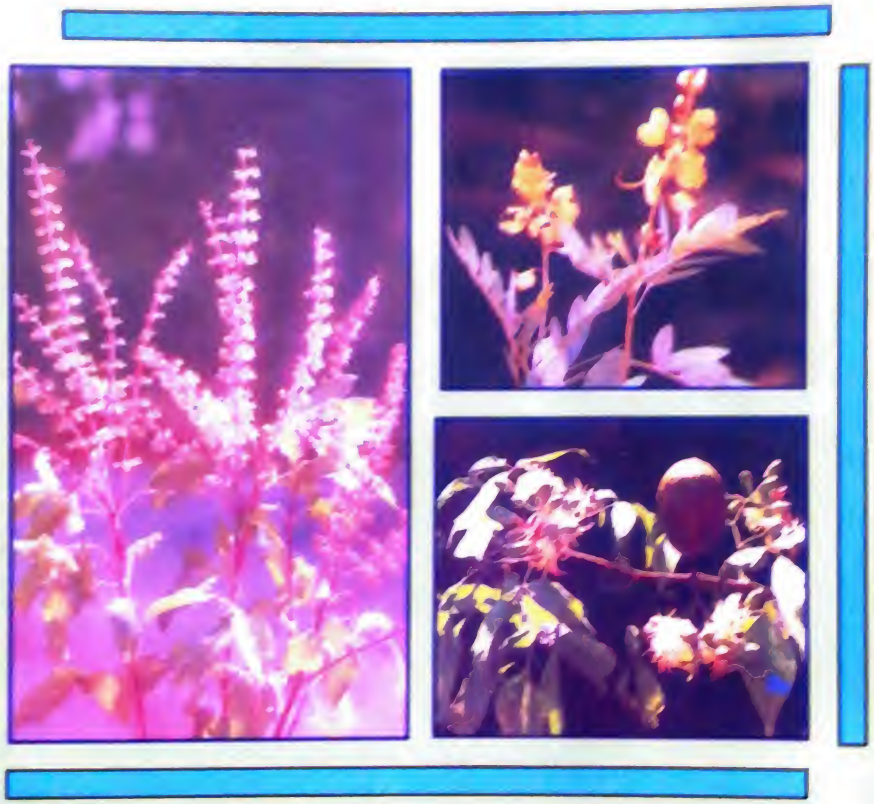
CULTIVATION PRACTICES OF SOME COMMERCIALLY IMPORTANT MEDICINAL PLANTS



NATIONAL MEDICINAL PLANTS BOARD
(DEPARTMENT OF ISM&H)
MINISTRY OF HEALTH & FAMILY WELFARE
GOVT. OF INDIA

CULTIVATION PRACTICES OF SOME COMMERCIALLY IMPORTANT MEDICINAL PLANTS

Corrigendum

The Medicinal Plants have to be grown only by way of Organic Farming, wherever there is mention about application of chemical fertilizer in the book it may kindly be ignored. Therefore, for extensive cultivation of Medicinal Plants, application of chemical fertilizer, weedicide & pesticides have not to be applied in any case.

So that the planting material, raw material & other related products are totally based on organic farming.

Chief Executive Officer
National Medicinal Plants Board (NMPB)

CULTIVATION PRACTICES OF SOME COMMERCIALLY IMPORTANT MEDICINAL PLANTS

NATIONAL MEDICINAL PLANTS BOARD
(Department of Indian Systems of Medicine & Homoeopathy)
Ministry of Health & Family Welfare
Government of India
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SECRETARY TO GOVERNMENT OF IND
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RED CROSS BUILDING, NEW DELHI - 110

FOREWORD

India has a rich treasure of medicinal plants due to the diversity of agro-climatic conditions spread all over the country. Medicinal plants occupy an important position in the spiritual and socio-cultural lives of our people as we firmly believe in the inherent properties of such plants to ward off diseases and promote good health.

2. The World Health Organisation (WHO) has estimated that 80% of the population of developing countries rely on traditional medicine mostly derived from plants, for their primary health care needs. The demand of medicinal plants is increasing throughout the world. 90% of the drugs used in Indian Systems of Medicine & Homoeopathy (ISM&H) are plant based and collected from wild sources without applying scientific management techniques, essential to sustain their growth and preserve their properties which determine the efficacy of the medicine. This resource is becoming scarcer day by day because of over exploitation and unscientific harvesting practises. Primitive plucking, packaging and storage methods, inadequate quality control and lack of standardisation of the raw material depletes the potency and efficacy of the plant based drugs. Sustainable management and harvesting of medicinal plants can conserve bio-diversity, promote environmental health, generate employment opportunities, provide affordable drugs and augment exports. Cultivation of medicinal plants can provide handsome returns to farmers and cultivators.

3. Government of India has set-up a national level body called the Medicinal Plants Board for the development and sustainable use of medicinal plants in the country. The Board aims at making the cultivation of medicinal plants and its sustainable management, a people's movement. The medicinal plant species included in this publication represent high demand plants, which can give good remuneration if a tie up with buyers is arranged. This booklet is an attempt to provide basic information on the agro-techniques of 31 species, widely used in the ISM&H and assessed by 03 expert committees to have an assured market. The material has been put together to enable the interested growers and farmers to take-up cultivation of medicinal plants. Agro-techniques on these plants are also available and can be accessed from the Department of ISM & H.

4. I hope this booklet will serve as a handy guide for the growers of medicinal plants and I wish the **Medicinal Plants Board** steered by Shri R. B. S. Rawat, Chief Executive Officer, Dr. S. K. Sharma, Advisor (Ayu.) and officers of the Medicinal Plants Board Dr. V. K. Singh, Survey Officer, Dr. K. V. Billore, Research Officer (Bot.), and Dr. Rajat Rashmi, Research Officer (Plant Introduction), who have all contributed in bringing out this booklet, success in this endeavour.

New Delhi,
6th May 2002.

(Malti S. Sinha)

PREFACE

India has 16 Agro-climatic zones, 45000 different plant species and 15000 medicinal plants that include 7000 plants used in Ayurveda, 700 in Unani medicine, 600 in Siddha medicine, 450 in Homoeopathy and 30 in modern medicine. This makes India one among 12 mega bio-diverse countries of the world and despite having only 2.5% of total land area, the country accounts for over 8% of the recorded species of the world. The Indian Systems of Medicine have identified 1500 medicinal plants, of which 500 species are commonly used in the preparation of ISM&H drugs. More than 150 plant species have been categorised as endangered. WHO's forecast is that the global market for herbal products is expected to be US$ 5 Trillion by 2050. Herbal remedies would become increasingly important as people seek natural remedies and gentler, safer products to deal with the prevention of ill health and the promotion of good health. India, with its diversified biodiversity has tremendous potential and a natural advantage in this emerging area.

The medicinal plants sector at present is not well organised and needs special attention. Although different Ministries and Departments in the Government sector and NGOs and individuals in the private sector are making efforts in different directions, yet there is a need to co-ordinate and systematise these efforts. An appropriate mechanism for coordination and implementation of policies relating to medicinal plants both at the National and State levels is necessary to facilitate inter-ministry, inter-state and institutional collaboration and to avoid duplication of efforts. Therefore, a need for the establishment of a national level nodal body was felt to formulate policies for the medicinal plants sector and develop the potential of this sector through schemes and projects that encourage investment in this sector.

As such, the **Medicinal Plants Board** was set up under a Government Resolution notified on 24th November 2000 under the Chairmanship of Union Minister for Health & Family Welfare. The objective of establishing a Board was to establish an agency which would be responsible for co-ordination of all matters related to medicinal plants, including drawing up policies and strategies for conservation, proper harvesting, cost-effective cultivation, research and development, processing, marketing of raw material in order to protect, sustain and develop this sector. The work would continue to be carried out by the respective, departments, organisations but the Board would coordinate and provide a direction and an impetus to the activities.

The Board will undertake the following activities:

1. Promote encouragement for cultivation of selected medicinal plants backed by buy-back arrangements.
2. Encourage States and UTs to registering raw drug traders and cultivators so that source of supply of medicinal plant is monitored as a measure to promote quality control, safety and efficacy of drugs.
3. Facilitate measures, which enhance efficiency, cost effectiveness and upgradation of harvesting, drying, grading, packaging, transportation and storage of medicinal plants.
4. The following thirty-one (31) species, which are in high demand both in domestic and international markets are to be brought into cultivation status as these constitute a bulk of the ingredients used in the preparation of ISM&H and herbal products. This list will naturally undergo changes from time to time.

S. NO	COMMON NAME	BOTANICAL NAME	
1.	Amla	*Emblica officinalis* Gaertn	Perennial tree
2.	Ashok	*Saraca asoca* (Roxb.) de Wilde	Perennial tree
3.	Ashwagandha	*Withania somnifera* (Linn.) Dunal	Annual herb
4.	*Atees	*Aconitum heterophyllum* Wall. ex Royle	Biannual herb
5.	Bael	*Aegle marmelos* (Linn) Corr.	Perennial tree
6.	Bhumi amlaki	*Phyllanthus amarus* Schum & Thonn. (*P. niruri* Linn.)	Annual herb
7.	Brahmi	*Bacopa monnieri* (L.) Pennell	Annual herb
8.	Chandan	*Santalum album* Linn.	Perennial tree
9.	*Chirata	*Swertia chirata* Buch-Ham.	Biannual herb
10.	Giloe	*Tinospora cordifolia* Miers.	Perennial climber
11.	Gudmar	*Gymnema sylvestre* R. Br.	Perennial climber
12.	Guggal	*Commiphora wightii* (Arn.) Bhandari	Annual climber
13.	*Isabgol	*Plantago ovata* Forsk.	Annual herb
14.	Jatamansi	*Nardostachys jatamansi* DC.	Perennial herb
15.	Kalihari	*Gloriosa superba* Linn.	Annual climber
16.	Kalmegh	*Andrographis paniculata* Wall. ex Nees	Annual herb
17.	Kokum	*Garcinia indica* Chois.	Perennial
18.	*Kuth	*Saussurea costus* C. B. Clarke (*S.lappa*)	Annual herb
19.	*Kutki	*Picrorhiza kurroa* Benth ex Royle	Annual herb
20.	Makoy	*Solanum nigrum* Linn.	Annual herb
21.	Mulethi	*Glycyrrhiza glabra* Linn.	Perennial herb

22.	Musali Safaid	*Chlorophytum arundinaceum* Baker (*C. borivillianum*)	Annual herb
23.	Pashan Bheda (Coleus)	*Coleus barbatus* Benth.	Annual herb
24.	Pippal	*Piper longum* Linn.	Perennial climber
25.	*Rasaut (Daruhaldi)	*Berberis aristata* DC.	Perennial shrub
26.	Sarpgandha	*Rauwolfia serpentina* Benth. ex Kurz	Perennial herb
27.	*Senna	*Cassia angustifolia* Vahl.	Under shrub
28.	Shatavari	*Asparagus racemosus* Willd.	Perennial climber
29.	Tulsi	*Ocimum sanctum* Linn.	Annual herb
30.	Vai Vidang	*Embelia ribes Burm. f.*	Perennial shrub
31.	Vatsnabh	*Aconitum ferox* Wall.	Perennial herb

5. Undertake general and specialised surveys of the national and international market for medicinal plants and products for identifying niche areas.
6. Motivate and encourage States/UTs to set up State Medicinal Plants Board/ Vanaspati Van Societies who can give a focus and direction to medicinal plants related activities.
7. Support manufactures/NGOs and representative individuals for participation in international fairs, seminars and meetings with a view to create awareness and explore the international market for plant based herbal products.
8. Support R & D studies in the areas of post harvest management including increasing shelf-life, introducing better storage techniques and agro-techniques, enhance bio-availability to be taken up through CSIR, NBRI, CIMAP, ICFRE, RRLs, DBT, Horticulture and Forest Departments.
9. Launch efforts to create mass awareness about the importance of medicinal plants in all strata of society, rural and urban.

India is bestowed with a treasure of medicinal plants. The supply base of 90% herbal raw drugs used in the manufacture of Ayurveda, Siddha, Unani & Homoeopathy systems of medicine is largely from the wild. Besides this, plants are also used in various industries producing herbal items other than medicines. This wild source is speedily shrinking day-by-day. Therefore, there is a need for conservation and sustainable use of medicinal plants. Cultivation is clearly a sustainable alternative to the present collection of medicinal plants from the wild. This can be a potential provider of returns to the farmers/cultivators.

* Plants of high altitude

Keeping the above concept in view, the department of Indian Systems of Medicine & Homoeopathy has identified 31(thirty-one) potential medicinal plants. In the present booklet brief cultivation practices together with relevant information on these medicinal plants have been presented for the interested growers/cultivators either as a single crop or for intercropping.

13.5.2002.

(R. B. S. RAWAT)
Chief Executive Officer
NATIONAL MEDICINAL PLANTS BOARD

CONTENTS

AMLA

Emblica officinalis Gaertn. Family – Euphorbiaceae

A small to medium sized deciduous **tree**, 8-18m in height with crooked trunk and spreading branches. **Leaves** simple, sub sessile; **flower** greenish-yellow; **fruit** nearly spherical pale yellow with 6 vertical furrows.

COMMON NAMES: Amlaki, Indian gooseberry, Aonla, Amlika.

DISTRIBUTION:

Wild or planted throughout the deciduous forests of tropical India and on hill slopes up to1800M.

PART USED: Fruit.

CULTIVATION:

SOIL AND CLIMATE

Amla can be grown in light as well as heavy soils except purely sandy soil. Calcareous soil with rocky substratum can also be good. However, well-drained fertile loamy soil is the best for higher yield. The plants have capacity for adaptation to dry regions and can also grow in moderately alkaline soils.

It is grown extensively under tropical condition. Annual rainfalls of 630-800 mm have given good yield. The young plants up to the age of 3 years should be protected from hot wind during May-June and from frost during winter months. The mature plants can tolerate freezing temperature as well as temperature up to 46°C.

NURSERY RAISING AND PLANTING

Amla is generally propagated through seeds, but seed propagated trees bear inferior quality fruits and have a long gestation period. Shield budding is done on one-year-old seedlings with buds collected from superior strains yielding big size fruits. Older trees of inferior types can be rejuvenated and easily changed into superior type by top working.

The pits of $1m^3$ are prepared during May-June at a distance of 4.5 m spacing and should be left for 15-20 days exposed to sunlight. Each pit should be filled with surface soil mixed with 15 kg farmyard manure and one kg of super phosphate before planting the grafted seedling.

Weeding and Hoeing

Weeding & Hoeing is required in nursery.

Manure/Fertilizer

The young plant should be applied with 15-20 kg of well rotten FYM and the mature tree with 30-40 kg each year during September-October in addition to the 15kg of based dose. Application of 30 g nitrogen each year during September-October up to years for each tree is recommended. Every mature tree should be given a fertilizer dose of 1kg Urea 1 kg Super phosphate and 1.5 kg of MOP every year in two equal splits, once during September-October and again during April-May after setting of the fruit. The plants should be irrigated immediately after fertilizer application.

Irrigation

Amla plants hardly require irrigation during monsoon. Young plants require watering during summer months at 15 days interval till they have fully established. Watering of mature fruit bearing plants is advised during summer months at bi-weekly intervals to increase fruit set and to reduce fruit drop. It responds very well to drip irrigation. After the monsoon rains, during October-December about 25-30 litres of water per day per tree through drips should be given.

Harvesting/Post Harvesting Operation

Amla seedlings start bearing fruits in 7-8 years after planting, while the budded clones will start bearing fruits from the 5^{th} year onwards. The fruits are light green at first, but when they mature become dull greenish yellow. Best harvesting time of Amla fruits is February when the fruits have maximum ascorbic acid content. In South India, fruits are found throughout the year. The mature fruits are hard and they do not fall for gentle touch and therefore vigorous shaking is required. For getting attractive prices fruits after harvest should be made into different grades depending on the size. Fruits can also be harvested using long bamboo poles attached with hooks.

Yield

A matured tree of about 10 years will yield 50-70 kg of fruit. The average weight of the fruits is 60-70 g. One kg contains about 15-20 number of fruits. A well-maintained tree yields up to 70 years. The yield increases year by year up to 50 years.

Economics

The 8-year old plantation of one hectare will yield 20-25 tons of fruits with a cost of production of Rs.34, 000 per-hectare. The rate for 01 kg of fruit Rs.30-45.

Net income- per hectare (Year-2001)	Rs.20, 000/-

Note: Market for medicinal plants is volatile and the economics may vary.

Institute to be Contacted:

- **Utthan Centre for Sustainable Development & Poverty Alleviation, 18-A, Auckland Road,Allahabad-211001 (Uttar Pradesh)**

ASHOK

Saraca asoca (Roxb.) de Wilde. **Family – Fabaceae**

A small evergreen tree 6 to 9 m high found wild along **streams** or in shade of evergreen forests. **Leaves** pari-pinnate, 15-20 cm long, leaflets 6-12, oblong, lanceolate; **flowers** orange or orange-yellow very fragrant; **pods** flat, leathery; seeds 4-8 ellipsoid-oblong.

COMMON NAMES: Ashok, Sita Ashok,

DISTRIBUTION :

Almost throughout India up to an altitude of 720 m in the centre and eastern Himalayas & Khasi, Garo and Lushai hills. It is also found in the Andaman Islands.

PART USED: Stem Bark.

CULTIVATION:

SOIL AND CLIMATE

The plant requires slightly acidic to neutral soils for good growth with medium to deep well drained fertile soils. It grows well in tropical to sub-tropical situations under irrigation.

NURSERY RAISING AND PLANTING

Seeds and stem grafting can propagate the crop. The seedlings are planted in the well-manured field during the rainy season.

THINNING AND WEEDING

Weeding and thinning of the plants may be done as and when required usually after 15-30 days for better growth.

MANURE/FERTILIZER

Compost/Vermi compost, organic manure is preferred.

IRRIGATION

Normally grown as rainfed crop but for better yield irrigation may be done as per requirement (weekly/fortnightly)

HARVESTING/POST HARVESTING OPERATION

Bark is removed from about ten years or older tree and then it has to be sun dried.

ECONOMICS

The rate for 01 kg of dried bark ranges from Rs.120-150.
(YEAR-2001)

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTE TO BE CONTACTED:

- **KERALA AGRICULTURE UNIVERSITY,**
  VELLANIKKARA, TRICHUR,
  (KERALA)

ASHWAGANDHA

***Withania somnifera* (Linn.) Dunal Family – Solanaceae**

An erect branched **under shrub** up to 1.25 m in height, minutely stellate tomentose. Root fleshy, tapering, whitish brown. **Leaves** ovate; **flowers** greenish.

COMMON NAMES: Asgandh, Nagouri Asgandh, Punir.

DISTRIBUTION: Grows in dried parts in subtropical regions. Rajasthan (Nagour), Punjab, Haryana, Uttar Pradesh, Gujarat, Maharastra & Madhya Pradesh.

PART USED: Root, Leaf and Seed.

CULTIVATION:

SOIL AND CLIMATE

Grows well in sandy loam or light red soil, having pH 7.5-8.0 with good drainage. It can be cultivated between 600-1200 m altitude. The semi-tropical areas receiving 500-750 mm rainfall are suitable for cultivation of this rained crop. The crop requires dry season during its growing period. Temperature between 20^0C to 35^0C is most suitable for cultivation. Late winter rains are conducive for the proper development of the plant roots

LAND PREPARATION

Ashwagandha is usually grown in fields, which are not well covered by the irrigation systems. The field on which food crops cannot be taken profitably for the above reason may be used for *Ashwangandha* cultivation. The soil of the field selected for *Ashwagandha* cultivation is well pulverized by ploughing, disking or harrowing. The field may be then levelled.

NURSERY RAISING AND PLANTING

The crop can be sown either by broad casting or in lines. Line to line method is preferred as it increases root production and also helps in performing intercultural practices properly. The seeds are usually sown about 1-3 cm deep in June- July in nursery. A light shower after sowing ensures good germination. About 500-750 gm seeds are sufficient for 1-hectare field. Seeds can be treated, with Thiram or Indofil or Dithane **medicinal plants – 45** (@ 3 gm/kg seed), before sowing to protect seedlings from seed borne diseases. The seedling after

25-35 days after sowing can be transplanted in the field maintaining 60 x 60 cm spacing between the plants & the rows. It may be noted that since 'Asagnadh' is a rainy season Kharif crop, the time of sowing is decided by date of arrival of monsoon in that area

THINNING AND WEEDING

The seeds sown by broadcasting or in the line in furrows should be thinned out by hand at 25-30 days after sowing to maintain a plant population of about 30-60 plants per square meter (about 3.5 to 6 lakh plants/hectare). The plant density to be used may depend on the nature and fertility of the soil. On the marginal land the population is kept high. If some fertiliser (N:P:K::20:20:0) is applied then the population should preferably be kept at a lower level. One hand weeding at an early stage is sufficient to enable the Ashwagandha plants to take over the growth of weed which get suppressed by its smothering effect.

MANURE/FERTILIZER

The crop of *Ashwagandha* does not require heavy doses of Manure/Fertilizer. In Madhya Pradesh, where it is grown on commercial scale no fertilisers are applied and the crop is cultivated on only residual fertility. Studies at Indore Research Station have showed no response of nitrogen and phosphorous on its root yield.

IRRIGATION

Light shower after transplantation ensures establishment of seedlings. There is no need of irrigation if rainfall is at regular intervals. Excessive rainfall/water is harmful to the crop. Life saving irrigations may be applied, if required.

HARVESTING/ POST HARVESTING

The plants start flowering and bearing fruits from December onwards. The crop is ready for harvest in January-March at 150 to 180 days after sowing. The maturity of crop is judged by drying out of leaves and yellow red berries. The entire plant is uprooted for roots, which are separated from aerial parts by cutting the stem 1-2 cm above the crown. The roots are then either cut transversely into small pieces (7 to 10 cm) or dried as it is in the sun. About 650-800 kg roots can be obtained from 1 hectare on drying it comes to 350-435 kg.

Berries are hand plucked separately. They are dried and crushed to take out the seeds.

The dried roots, entire or transversely cut into smaller pieces, have to be further cleaned, trimmed and graded. The roots are beaten with a club, which removes adhering soil and breaks off the thin, brittle lateral rootlets. Lateral branches, root crown and stem remains on roots are carefully trimmed with the help of knife.

YIELD

On an average yield from one hectare land under commercial cultivation is an approx 3-5 quintal of dried roots and 50-75 kg seeds.

ECONOMICS

Expenditure per hectare	Rs.05, 600/-
Return per hectare	Rs.30, 000/
Net income	Rs.24, 000/- Approx
(YEAR-2001)	

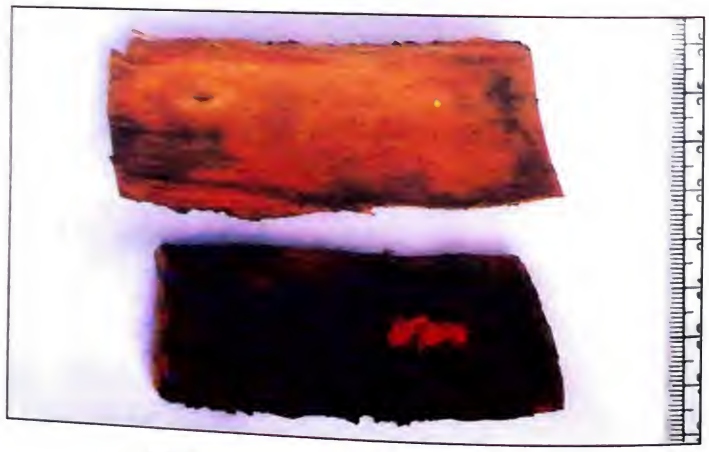
Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTES TO BE CONTACTED:

- **REGIONAL RESEARCH LABORATORY, JAMMU TAWI (JAMMU & KASHMIR)**
- **CIMAP, LUCKNOW (UTTAR.PRADESH)**
- **AGRICULTURE COLLEGE, INDORE (MADHYA PRADESH)**
- **UTTHAN CENTRE FOR SUSTAINABLE DEVELOPMENT & POVERTY ALLEVIATION18-A, AUCKLAND ROAD, ALLAHABAD-211001 (UTTAR PRADESH)**

Amla — *Emblica officinalis* Gaertn

Ashwagandha — *Withania somnifera* (Linn.) Dunal



Ashok — *Saraca asoca* (Roxb.) de Wilde

Atees — *Aconitum heterophyllum* Wall.

Bael — *Aegle marmelos* (Linn.) Corr.

Bhumi amlaki — *Phyllanthus amarus* Schum & Thonn.

ATEES

Aconitum heterophyllum Wall. ex Royle Family Ranunculaceae

A herbaceous, erect, biennial **herb**; **leaves** more or less hetromorphous; **flower** blue or violet, **fruits** follicles. **Root** tuberous in pair's whitish or grey, breaks very easily and taste very bitter. The plant is found in sub-alpine and alpine zone of the Himalayas, between 2400-3600 m.

COMMON NAMES: Aruna, Ativasa, Visa.

DISTRIBUTION: Hills of Himachal Pradesh, Uttaranchal, Jammu & Kashmir, Arunachal Pradesh and Sikkim

PART USED: Tuberous root

CULTIVATION:

SOIL AND CLIMATE

Sandy loam and acidic soil is best for seed germination, survival, better growth and yield. In general, cultivation up to 2200m elevation having sandy textured soil with rich organic matter is recommended for cultivation.

NURSERY RAISING AND PLANTING

Germination of seeds of *Aconitum heterophyllum* can be undertaken at lower altitude in polyhouse as well as in open nursery beds under different experimental conditions. Seeds sown in Styrofoam seedling trays containing sandy soil with litter treatment, gives maximum germinability when seeds were sown 0.5-0.7 cm. sowing depth inside polyhouse during November and December at lower altitude and during April in open beds at 2200m. Germination as well as true leaf initiation is earlier in sandy soil. Otherwise seedlings remained in cotyledonary stage (pseudomonocotyl) up to 3-4 months. About 44,000 plants could be planted in 1 acre of land. Seedlings raised at lower altitude during winter months are transplanted in nursery beds at higher altitude during April-May, which reduce their vegetative growth period. In open nursery beds seed germination is very low. Plants raised form seedlings have very slow growth and cotyledonary phase (pseudomonocotyl) remained at least for one growth season (3-4 months). Vegetative growth phase is for 3-4 years and at last it leads to

reproductive phase. Addition of forest litter or organic manure to the soil increases survivability and growth of seedling at lower altitude.

For vegetative propagation top tuber segment having innovation bud was found more successful. Top tuber segment produces single shoot, which was found more suitable for multiplication in comparison to middle and basal segments. Vegetative propagation was found most successful for multiplication as well as for higher production within short period than cultivation through seedlings.

MANURE /FERTILISER

Soil treated with higher litter concentration is suitable for high production. Survival of seedlings of *Aconitum heterophyllum* is observed 56% and higher concentration of litter doses (60-70q/acre) favoured the seedling growth.

IRRIGATION AND WEED CONTROL

Beds needed excessive watering/irrigation to decrease the mortality rate of seedlings. However, watering is not required during monsoon period in cultivated fields. Irrigation requirement also depends on the texture of soil. Frequent watering is required once at 24hrs interval for 6 months old seedlings at lower altitudes (1800-2200m) in dry season. Weeding during rainy season is required at weekly interval. During winter months irrigation is needed once in a week to retain moisture and weeding at 15-20 days interval is required when plant is cultivated at lower altitude.

HARVESTING/POST-HARVESTING

Harvesting of tubers is recommended after the completion of reproductive phase and maturation of seeds during October-November. Maximum yield is recorded during October-November period. However active content (atisine) and other alkaloids content were found maximum when plants were harvested in August-September at the time of onset of flowering period. Further percentage (%) of active contents slightly decreased with maturation of plant.

After completion of reproductive phase at any altitude, plants become mature for harvest and yield good percentage of active contents. Time of completion of reproductive phase differs with the altitude of cultivation. Generally the plants in alpine areas complete their reproductive phase in the last week of October or first of November while the plants cultivated at lower altitude complete their reproductive phase in the first half of October. Plants raised from

tuber cuttings completed their vegetative and reproductive phase within three years. The harvesting period for this species is 3-4 years.

YIELD

Per acre production from mature strands in natural pockets is estimated as 440kg.

ECONOMICS

The rate for 01 kg of dried tuberous root ranges from Rs.1000-1100.
(YEAR-2001)

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTE TO BE CONTACTED:

- **HIGH ALTITUDE PLANT PHYSIOLOGY CENTRE, HNB AHUGUMA, GARHWAL UNIVERSITY, SRINAGAR, GARHWAL (UTTARANCHAL)**

BAEL

Aegle marmelos Correa ex Roxb. Family – Rutaceae

A deciduous tree, 6.0 to 10 m in height and 0.9 to 1.2 m in girth, with straight, sharp, axillary thorns and trifoliate aromatic **leaves**. The stem **bark** is bluish grey, 4-8 mm thick, shallowly furrowed and corky. **Flowers** 3 cm in diameter, greyish-white, sweet scented, stalked. **Fruit** large about 15 cm diameter, globbose, ovoid and 8-15 celled.

COMMON NAMES: Bilva, Holy fruit tree, Bel.

DISTRIBUTION :

The tree is a native of India and is found wild throughout the Indian Peninsula, in dry hilly places ascending to 1200 m in the western Himalaya.

PART USED: Fruit, Root and Leaves.

CULTIVATION:

SOIL AND CLIMATE

Good sandy loam soil, sunny situation, warm humid climate are suitable for cultivation of this plant.

NURSERY RAISING AND PLANTING

Seeds generally propagate bael plants. Sowing is done in June or July. The development of seedlings is very slow. They require at least one year in the nursery to be fit for transplanting. They should be transplanted in rainy season; the stem is ordinarily 5-7 cm tall with 3-5 leaves and the taproot, 20-25 cm long. It is also propagated by root cuttings and stem cuttings treating with IBA (4000 ppm) using quick dip method. Seedlings or budded plants are transplanted in the field at a spacing of 10-12 m. Budded plants start bearing fruits at the age of 4-5 years, whereas seedling trees require 7-8 years.

MANURE/THINNING AND WEEDING

It requires attention during first year when they are well manured and weeded after the rains.

IRRIGATION

The field after plantation should be irrigated periodically as and when required weekly or fortnightly.

HARVESTING/POST HARVESTING OPERATION

The fruits are deep green initially and become yellow gradually at ripening. The fruits are harvested along with a portion of fruiting stalk as it serves as a signal of ripening. It is easily detached only in the ripe fruits. The fruits require about a year for ripening.

YIELD

The average yield is 300-400 fruits per tree. The quality of fruits is greatly associated with the weight and size of the seed-sacs. The larger and heavier the seed sacs, the greater is the amount of mucilage and poorer the quality.

ECONOMICS

The rate for 01 kg of fruit pulp ranges from Rs.40-45.
(YEAR-2001)

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTE TO BE CONTACTED:

- **NARENDRA DEV UNIVERSITY OF AGRICULTURE AND TECHNOLOGY, KUMARGANJ, FAIZABAD (UTTAR PRADESH)**

BHUMI AMALAKI

Phyllanthus amarus **Schum & Thonn.** **Family - Euphorbiaceae**

Small erect annual herb 10-60 cm tall. Leaves small elliptic-oblong; flowers, whitish-green & minute.

COMMON NAMES: Tamalaki, Hazardana, Jarmala & Jangli Amala

DISTRIBUTION: The plants grow abundantly throughout India up to 700 m altitude during rainy season, however, with less frequency in southern part of the country. Uttar Pradesh, Haryana, Punjab, Maharashtra, Tamil Nadu, Kerala, Andhra Pradesh, Karnataka, Bihar, Orissa and Bengal

PART USED: Whole plant

CULTIVATION:

SOIL AND CLIMATE

Bhumi Amalaki is found to be well adapted to variety of soils, at soil pH ranging from alkaline to natural and acidic soil. Plants have also shown preference for calcareous well drained and light textured soils. *Phyllanthus amarus* is a circum-tropical weed, it grows well under tropical conditions. It, however rarely survives under dry or very low temperature conditions but water logging does not show any lethal effects

NURSERY RAISING & TRANSPLANTING

The plants are propagated through seeds. About 1 kg of seeds are sufficient for seedlings for transplanting in one hectare of land. For raising the seedlings, the seeds are sown in well prepared nursery beds. Well decomposed farmyard manure should be mixed with top layer of the soil while preparing the beds. Being minute, the seeds are mixed with dry soil or sand to allow uniform distribution of seeds on the nursery bed. Later a thin layer of soil is spread to cover the nursery beds. Appropriate moisture is maintained in the beds till the seeds have germinated. In north Indian plains, the month of April-May was found very good for sowing for higher rate of germination of seeds and good herb yield.

Approximately 15-30 days old seedlings, which are about 10 cm tall, are transplanted in the field at horizontal and vertical spacing of 15 cm each. A

proper irrigation just after transplanting ensures establishment of seedlings. The crop raised by transplanting of seedlings gives improved yield of herbage

WEEDING

The field should be kept absolutely free from weeds for which regular hand weeding in every month is required. Spraying of commercial herbicides are not desirable, since, these cause deterioration to the crop and also to avoid residual effect in the crude drug.

MANURE/FERTILIZER

Organic manures are preferred. The crop does not have any specific requirement for N K and P however, farmyard manure or nitrogenous fertilizers, if applied in appropriate quantities, when plants are about 30 cm in height, would render better growth and higher herb yield.

IRRIGATION

In southern parts of country, where there is frequent rainfall during rainy season, no irrigation may be required. However, in Northern plains, where there is infrequent rainfall, one irrigation per fortnight is required. Waterlogging, fortunately is not a problem for this plant.

HARVESTING/POST-HARVESTING

Plants are harvested when the rainy season is over, when they are still green and herbaceous. Since the active constituents of *P. amarus* concentrate more in the leaves, production of higher leaf mass is desired for the extraction. Plants in September contain highest amount of leaves and found to be suitable for harvesting.

ECONOMICS:

Expenditure per hectare	Rs.5000/-
Return per hectare	Rs.20000/-
Net income	Rs.15000/-
Rate per Kg.- Rs.35-40	
(YEAR-2001)	

Note: Market for medicinal plants is volatile an economics may vary.

INSTITUTES TO BE CONTACTED:

- CENTRE FOR ADVANCE STUDIES IN BOTANY, UNIVERSITY OF MADRAS GUINDY CAMPUS, CHENNAI.

BRAHMI

Bacopa monnieri (L.) Pennell Family - Scrophulariaceae

A creeping succulent herb branches profusely and rooting at the nodes. The succulent leaves are sessile, opposite, decussate, obovate-oblanceolate in shape, 1.0-2.5 cm x 0.4-1.0 cm in size. It is found in damp or marshy areas near streams or on the border of ponds, throughout India.

COMMON NAMES: Bramhi, Jal-Nim & Brami.

DISTRIBUTION: It is found in Uttar Pradesh, Punjab, Haryana, Bihar, Bengal, Tamil Nadu, Kerala, Karnataka, Foot hills of Himachal Pradesh & Uttaranchal.

PART USED: Whole plant

CULTIVATION:

SOIL AND CLIMATE

The plant is known to grow under varying soil and climatic conditions. It grows exceptionally well in poorly drained soils and waterlogged areas under sub-tropical conditions. The plants grow faster at high temperatures (33-40^0 C) and humidity (65-80%) and should be cultivated in summer as rainy season begins.

LAND PREPARATION

The field should be ploughed thoroughly and made free from weeds. The land should be irrigated a day before planting for successful establishment of plant cuttings.

TRANSPLANTING

Plant cuttings about 4-5 cm long, each containing a few leaves, nodes and roots are ideal planting materials. These can be obtained by cutting mother plants into small pieces with roots. The cutting is transplanted in wet soil at spacing of 40 cm x 40 cm. Flood irrigation is provided immediately after planting. Ideally, the plants should be transplanted in March-June and are allowed to grow and proliferate through hot and humid months of monsoon till September after which harvesting should be done. The plants can also be maintained in a perennial state

with two harvests in a year, the first one in June and the other one after monsoon, in October.

MANURE/FERTILIZER

Five tonnes of well-decomposed farmyard manure per hectare should be applied to the field at the time of field preparation. In order to get good herb yield, 100 kg N per hectare should be applied in three split doses. A basal dose of 60 kg each of P and K should also be given at the time of planting.

IRRIGATION

Immediately after transplanting irrigation is essential for the successful survival of the plants. Subsequently, the fields are irrigated by flooding as per requirement usually every 7-8 days. There is no need for irrigation during the monsoon.

WEEDING

Initially hand weeding is required every 5-20 days. Later as the plant proliferate and forms a dense mat of vegetation, weeding may be required sporadically.

HARVESTING/POST-HARVESTING

The plants should be harvested between October-November, after that there is loss of plant biomass and bacoside yield. The plant can be ideally harvested by cutting in such a way so that the upper portions of the stem 4-5 cms from the base are removed and the rest left for subsequent regeneration.

The plants can be dried in a conventional manner by spreading on the ground under shade at room temperature. Alternatively, they can be treated at 80^0 C in oven for 30 minutes immediately after harvest for a two-fold more retention of bacoside-A content of dried herb. After treatment they can be further air dried by spreading on the ground at room temperature or in the oven at 37^0 C. The material is to be cleaned free of any external matter. The dry material should be stored in a cool dry room packed in bags/boxes having concrete flooring, away from walls. Precautions also need to be taken to avoid infestation with fungi and insects

YIELD

The fresh and dry herb yields of Brahmi go upto 300q/hectare and 60/q/ hectare, respectively, when harvested after September while bacoside-A yield can

be as much as 85kg/ hectare. After the first harvest, 40q dry herb yield from the June harvest, totalling to 100-q dry herb yield in a year will be obtainable.

ECONOMICS

Expenditure per hectare	Rs.35, 000/-
Gross return @Rs.20/kg of dry matter yield	Rs.2, 00,000/-
Net income	Rs.1, 65,000/-

(YEAR-2001)

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTE TO BE CONTACTED:

- **HERBAL GARDEN, HERBARIUM & RESEARCH INSTITUTE, JOGINDER NAGAR, SHIMLA (GOVT OF HIMACHAL PRADESH) (HIMACHAL PRADESH)**
- **CENTRAL INSTITUTE OF MEDICINAL AND AROMATIC PLANT (CIMAP), LUCKNOW (UTTAR PRADESH)**
- **NATIONAL INSTITUTE OF PHARMA EDUCATION & RESEARCH CENTRE, SECTOR 09 SAS NAGAR, MOHALI (PUNJAB).**
- **UTTHAN CENTRE FOR SUSTAINABLE DEVELOPMENT & POVERTY ALLEVIATION 18-A, AUCKLAND ROAD, ALLAHABAD-211001 (UTTAR PRADESH)**

CHANDAN

Santalum album Linn. Family – Santalaceae

A small evergreen tree, and a partial root parasite, attaining a height of 12-13m. and girth of 1to 2.4m. with slender druping as well as erect branching. The tree starts flowering at an early age of 2 to 3 years. **Fruit** is drupe, purplish when fully mature and single seeded.

COMMON NAMES: Sandal wood, Safed Chandan , Sandal , Chandana

DISTRIBUTION: It is distributed in the dry scrub forest of Salem, Mysore, Coorg, Coimbatore, Nilgiris up to 900 m. altitude, also found in Andhra Pradesh, Bihar, Gujarat, Karnataka, Madhya Pradesh, Maharashtra and Tamil Nadu.

PART USED: Heart Wood

CULTIVATION:

SOIL AND CLIMATE

Grows well in red sandy loam soil. Crop requires humid & hot climate.

NURSERY RAISING AND PLANTING

Two type of seed beds are used to raise sandal seedlings: sunken and raised beds. Both of them perform equally well under different climatic conditions.

Seed beds are formed with only sand and red earth in the ratio 3:1 and are thoroughly mixed with nematicides (Ekalux or Theimet at 500gm. per bed of 10mx 1m.) Around 2.5 kg seed is spread uniformly over the bed, covered with straw, which should be removed when the leaves start appearing on the seedlings. Sandal suffers from a very virulent disease caused by combined fungal and nematode infection. Seedbeds are to be sprayed with fungicide Dithane Z-78 (0.25%) once in 15 days to avoid fungal attack and 0.02% Ekalux solution once in a month to avoid nematode attack.

When seedlings have reached 4 to 6 leaf stage they are transplanted to poly bags along with a seed of "tur dal" *(Cajanus cajan),* the primary host for better growth of sandal. Seedlings are carefully removed from beds with all roots intact; roots should not be allowed to dry. Shade can be provided for a week

avoided. Host plants are to be pruned frequently, so that they do not over grow sandal and hamper its growth. Polybags should contain soil mixture of ratio 2:1:1 (Sand: Red earth: Farmyard manure). It has been found that poly bags of 30 x 14cm size are the best.

Plantable seedlings of about 30cm height can be raised in 6-8 months' time. A well-branched seedling with a brown stem is ideal for planting in the field.

THINNING AND WEEDING

Weeding is to be done at regular intervals.

MANURE/FERTILIZER

20t Farm-yard-manure (FYM)/hectare is required for good growth.

IRRIGATION

It is a rainfed crop. Young plants require watering in summer months at 15-20 days interval till they are fully established.

HARVESTING/POST HARVESTING OPERATION

Sandal wood trees are harvested at the age of 30-60 years. The soft wood is first removed; the hard wood is chipped and then converted into powder in a mill. The powder is soaked in water for 48 hours and then distilled. Distillation takes place in 48 hours. The oil is rectified by re-distillation and filtration.

YIELD

Sandal is considered to be a slow growing tree. It grows at the rate of 5 cm. of girth or more per year under favourable soil and moisture conditions. The heartwood formation starts around ten years of age. The following table gives an idea of growth and development:

AVERAGE HEARTWOOD FORMATION PER TREE

Age (year)	Grith at breast height cm.	Yeild of heartwood in kg.
10	10	1
20	22	4
30	33	10
40	44	20
50	55	30

ECONOMICS

The retail rate of heartwood at the Government emporium is Rs.350/-per kg. (YEAR-2001)

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTE TO BE CONTACTED:

- UTTHAN CENTRE FOR SUSTAINABLE DEVELOPMENT & POVERTY ALLEVIATION, 18-A, AUCKLAND ROAD, ALLAHABAD-211001 (UTTAR PRADESH)
- DEPARTMENT OF FORESTS, BANGALORE

CHIRATA

Swertia chirata Buch – Ham. Family - Gentianaceae

An annual **herb** 30-80 cm. high; **leaves** lanceolate acute; **flowers** greenish-purple. It grows naturally. Flowering & fruiting July to September.

COMMON NAMES: Chirayata, Kirata & Kirataka.

DISTRIBUTION: In temperate to sub-alpine Himalayan areas from J&K, H.P., U. P. to Arunachal Pradesh on slopes between 1800-3600 m. altitude Himachal Pradesh, Uttranchal, Sikkim & Arunachal Pradesh.

PART USED: Whole plant

CULTIVATION:

SOIL AND CLIMATE

The plant can be grown in variety of soils with sandy loam rich in carbon and humus. It can be grown in sub-temperate regions between ± 1500 to 2100m. altitude.

NURSERY RAISING AND PLANTING

Nursery beds are prepared in selected areas in suitable climatic conditions. Seeds are sown during May-June. After 3-4 months seedlings are transplanted in the field in rows at a distance of 45-60cm. The distance between two rows is kept about 60 cm.

WEEDING AND HOEING

Periodical weeding and hoeing is required in nursery and field.

MANURE/FERTILIZER

Compost manure or organic manure is preferred. Super phosphate or Potash can also be used in appropriate dose.

IRRIGATION

The nursery beds and field after plantation should be irrigated periodically as and when required weekly or fortnightly. The plants are irrigated till it flowers.

HARVESTING/POST-HARVESTING

The Crop is usually ready for harvesting after 6-8 months. The plants are collected and dried in shade.

ECONOMICS

The rate for 01 kg of Chiraita whole plant ranges from Rs. 300-350.
(YEAR-2001)

Note: Market for medicinal plants is volatile and the economics may vary.

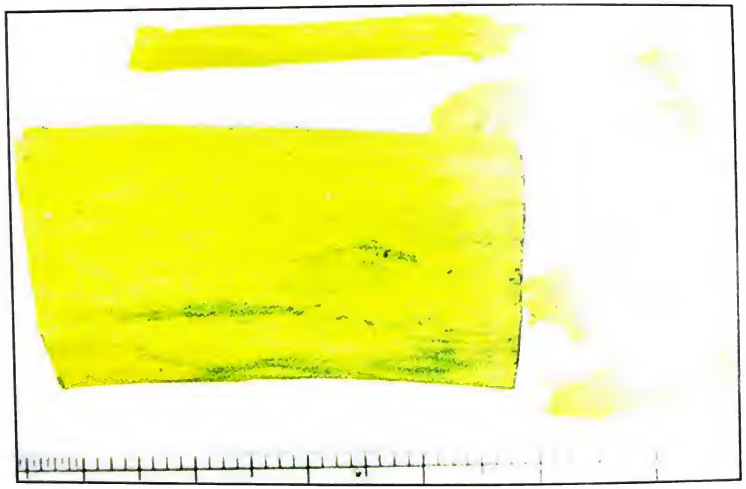
INSTITUTES TO BE CONTACTED:

- HIMACHAL PRADESH KRISHI VISHVA VIDHYALAYA, PALAMPUR
  (HIMACHAL PRADESH)

- S. K. UNIVERSITY OF AGRICULTURE SCIENCE & TECHNOLOGY
  SHALIMAR (JAMMU & KASHMIR)

Brahmi — *Bacopa monnieri* (L.) Pennell

Giloe — *Tinospora cordifolia* Miers.



Chandan — *Santalum album* Linn.

Gudmar — *Gymnema sylvestre* R. Br.

Isabgol — *Plantago ovata* Forsk.

Guggal — *Commiphora wightii* (Arn.) Bhandari

GILOE

Tinospora cordifolia Miers. Family – Menispermaceae

A large extensively spreading, perennial woody climber with succulent stems. **Leaves** simple, alternate, cordate-ovate; flowers unisexual dioecious, yellow. **Fruit** of 3 shortly stalked subglobose drupes.

COMMON NAMES: Guduchi, Gurach, Tinospora and Gilo.

DISTRIBUTION :

Throughout tropical regions of India extending from Kumaon to Assam and Myanmar, Bihar, Konkan to Sri Lanka. It is a large climber which grows over the highest trees in the forests and throws out aerial roots which reach the length of 10 metres, though not thicker than pack-thread.

PART USED: Stem.

CULTIVATION:

SOIL AND CLIMATE

It grows well in almost all types of soils and under varying climatic conditions.

NURSERY RAISING AND PLANTING

The plant is cultivated by stem cutting in the month of May-June. It requires some support preferably Neem and Mango trees, such plants are supposed to possess better medicinal values.

WEEDING AND HOEING

Periodical hoeing is done, both in the nursery and field as per requirement.

MANURE/FERTILIZER

Compost manure or organic manure is preferred at nursery level.

IRRIGATION

The field after plantation should be irrigated periodically as and when required weekly or fortnightly.

HARVESTING/POST HARVESTING OPERATION

Mature plants are collected, cut into small pieces and dried in shade.

YIELD

Approximately 8-10 q/hectare

ECONOMICS

The rate for 01kg of dried stem ranges from Rs.15-20.
(YEAR-2001)

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTES TO BE CONTACTED:

- **JAMIA HAMDARD, HAMDARD NAGAR NEW DELHI-110062**

GUDMAR

Gymnema sylvestre R. Br. Family - Asclepiadaceae

A woody climber with small yellowish flowers and simple opposite, ovate – elliptic hairy leaves. It is found wild in various deciduous forests of India.

COMMON NAMES: Madhunasini, Merasingi and Gudmar Buti

DISTRIBUTION: It is found in Uttar Pradesh, Madhya Pradesh, Maharastra, Punjab, Haryana., Tamil Nadu, Andhara Pradesh, Kerala, Karnataka, Bihar & Bengal.

PART USED: Leaves and Roots

CULTIVATION:

SOIL AND CLIMATE:

The plant grows in a variety of soil and agro-climatic conditions in tropical and sub-tropical regions up to 600 m.

NURSERY RAISING AND PLANTING:

Mature seeds are collected between October-December and sown in poly-boxes/bags or small plots as nursery. The raised seedlings are transplanted in field during February-March. The plant grows well with the on-set of rainy season. The climber is given proper support for its better growth and development. It can also be planted in between trees as intercropping.

The plant can also be propagated through cuttings and planted during rainy season.

WEEDING AND HOEING:

Periodical weeding and hoeing is required, particularly during and after rainy season.

MANURE AND FERTILISER:

Compost or Vermicompost is preferred for application while preparing the soil for nursery and in the field plantation. NPK can also be applied.

IRRIGATION

Periodic irrigation as and when required may be done weekly/fortnightly.

HARVESTING/POST-HARVESTING

After one-year leaves are ready for harvesting. The leaves are usually collected during October-February and are cleaned, dried in shade. The roots are collected during summer and are cleaned, washed and cut in to pieces and dried.

ECONOMICS

The rate for 01 kg of crude drug ranges from Rs.12-15.
(YEAR-2001)

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTE TO BE CONTACTED:

- **CENTRE FOR ADVANCE STUDIES IN BOTANY, UNIVERSITY OF MADRAS, GUINDY CAMPUS, CHENNAI.**

GUGGAL

***Commiphora wightii* (Arn.) Bhandari Family – Burseraceae**

A shrub or small tree reaching up to 3 to 4 m. high. **Leaves** sessile, alternate, 1-3 foliate. Plants dimorphic, one having bisexual and male **flowers** and other female flowers. **Fruit** ovoid, drupe.

COMMON NAMES: Guggulu, Guggal

DISTRIBUTION :

Found in Karnataka, Rajasthan, Deccan and Gujarat.

PART USED: Olio gum-resin

CULTIVATION:

SOIL AND CLIMATE:

It can be cultivated in sandy to silt-loam or rocky soils, poor in inorganic matter but rich in several other minerals. The growth is faster in the soils, which have moisture-retaining capacity.

NURSERY RAISING AND PLANTING:

The plants are best raised from stem cutting semi-wood (old) branch. One-meter long woody stem of 10mm thickness is selected and the cut end is treated with IBA & NAA and planted in a well-manured nursery bed during June-July months; the bed should be given light irrigation periodically. The cuttings initiate sprouting in10-15 days and grow into good green sprout in next 10-12 months. These rooted plants are suitable for planting in the field during next rainy season. The cuttings give 80-94% sprouting.

Seeds can grow plants also, seed germination is very poor (5%) but seedlings produce healthier plants, which withstand high velocity wind.

THINNING AND WEEDING:

The plantation does not require much weeding and hoeing operation. But soil around the bushes should be pulverised twice in a year to increase the growth.

MANURE/FERTILIZER

Application of 5 kg FYM and 25-50gm. urea per plant per year is sufficient.

IRRIGATION

Requires moderate irrigation. Even a limited irrigation during summer season improved rate of growth.

HARVESTING/POST HARVESTING OPERATION

Plants attain normal height and girth after 8-10 years of growth when they are ready for tapping of the gum by shallow incision on the bark between December and March.

YIELD

Approximate 500-800gm gum per well grown plant.

ECONOMICS

Expenditure per hectare is Rs.2, 50,000/- after 8 years of plantation. Rate of 01kg Guggal is Rs.65-85

(YEAR-2001)

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTES TO BE CONTACTED:

- GUGGAL HERBAL FORM MANGLIAWAS
  CCRAS, AJMER (RAJASTHAN)

- DEPARTMENT OF BOTANY
  J. N. VYAS UNIVERSITY
  JODHPUR-342001 (RAJASTHAN)

ISABGOL

Plantago ovata Forsk. Family – Plantaginaceae

A 10-15cm tall short-stemmed annual herb. **Leaves** are born alternately on the stem. **Flowers** in terminal spikes; fruit a capsule. **Seeds** are translucent and concavo-convex.

COMMON NAMES: Ishagola, Isabghul, Spogel seed, Ispaghal

DISTRIBUTION: Indigenous to the Mediterranean region and West Asia, It has been introduced in India & cultivated especially in Gujarat and some parts of Rajasthan.

PART USED: Husk from spikes and seeds.

CULTIVATION:

SOIL AND CLIMATE:

It is an irrigated crop, which grows well on light soils; soil with poor drainage is not conducive for good growth of this crop. A silty-loam soil having pH from 4.7 to 7.7 with high nitrogen and low moisture content is ideal for growth of plants and high yield of seeds.

Isabgol thrives well in warm- temperate regions. It requires cool and dry weather and is sown during winter months. Sowing during first week of November gives best yields. Early sowing makes the crop vulnerable to downy mildew disease, whereas late sowing provides lesser period of growth in winter along with possibility of shattering of seeds due to summer rains in April-May. At maturity, if the weather is humid, its seeds shatter resulting reduction in yield. Heavy dew or even a light shower will proportionately decrease the yield, at times leading to even total loss of the crop. The temperature requirement for maximum seed germination is reported to be 20 to 30^0C.

LAND PREPARATION

Field must be free of weeds and clods. The number of ploughings, harrowing and hoeing depends upon the soil conditions, previous crop and degree of weed infestation. About 10-15 tonnes of FYM per hectare is mixed into the soil at the time of last ploughing. The field should be divided into suitable plots of convenient size, depending upon the texture of the soil, the slope of the field

and quantum of irrigation. For light soil with even contour, plot size of 8.0 m x 3.0 m will be convenient.

Nursery Raising and Planting

To obtain high percentage of germination, seeds should be taken from the crop harvested at the end of the preceding crop season. Old seeds tend to lose viability under ordinary storage conditions. Seeds at the rate of 4-8 kg per hectare are sown after treating it with any mercurial seed-dresser at the rate of 3 g/kg of seed, to protect the seedlings from the possible attack of damping off.

The seeds are small and light. Hence before sowing, the seeds are mixed with sufficient quantity of fine sand or sieved farmyard manure. The seeds are broadcasted because sowing in lines at different spacing does not increase the seed yield. After broadcasting, seeds are swept lightly with a broom to cover them with some soil. Broom however, should be swept in one direction only, to avoid deep burial of the seed for uniform germination. The sowing should immediately be followed by irrigation. Germination begins in four days after sowing. If delayed, it should be stimulated by another watering.

Weeding and Hoeing

Periodical weeding and hoeing is required.

Manure/Fertilizer

Isabgol does not require the application of heavy doses of fertilizers. A fertilizer dose consisting of 50 kg of N. 25 kg of P_2O_5 and 30 kg of K_2O (NPK) per hectare has given the maximum seed yield. The full dose of phosphorus and potassium along with half of the nitrogen is given as a basal dose at the time of sowing itself and the second split dose of nitrogen is applied as a top dressing after one month of sowing.

Irrigation

Immediately after sowing, light irrigation is essential. First irrigation should be given with light flow or shower of water otherwise, with fast current of water most of the seeds will be swept to one side of the plot and the germination and distribution will not be uniform. The seeds germinate in 6-7 days. If the germination is poor, second irrigation should be given. Later on irrigations are given as and when required. Last irrigation should be given at the time when

maximum number of spikes shoots up. The crop requires 6-7 irrigations for its good productivity in medium sandy soils.

Harvesting/Post Harvesting Operation

Blooming begins two months after sowing and the crop become ready for harvest in February-March (110-130 days after sowing). When mature, the crop turns yellowish and the spikes turn brownish. The seeds are shed when the spikes are pressed even slightly. At the time of harvest, the atmosphere must be dry and there should be no moisture on the plant; harvesting will lead to considerable seed shattering. Hence, the crop should be harvested after 10. am.

Yield

Gujarat *Isabgol*-1, variety yields 800-900 kg of seeds per hectare. The new variety '*Gujarat Isabgol-2*' has a potential to yield 1,000 kg of seeds per hectare.

Economics

Expenditure per ha.	Rs.25,000/-
Return per ha.	Rs.63000/-
Net income	Rs.38000/-
(Year-2001)	

Note: Market for medicinal plants is volatile and the economics may vary.

Institute to be Contacted:

- **Utthan Centre for Sustainable Development & Poverty Alleviation, 18-A, Auckland Road, Allahabad-211001 (Uttar Pradesh)**

JATAMANSI

Nardostachys jatamansi DC. Family - Valerianaceae

An erect perennial **herb**, 10-60 cm in height, with woody stout, rootstock covered with reddish brown fibres of the petioles of radical leaves. **Leaves** radical, longitudinally nerved; **flower** pale-pink or blue.

COMMON NAMES: Mamsi, Balchara & Sumbul-ut-teeb

DISTRIBUTION: Found in alpine Himalayas from 3,300-5000m heights. Hills of Himachal Pradesh, Uttaranchal, Jammu & Kashmir and Sikkim.

PART USED: Rhizome

CULTIVATION:

SOIL AND CLIMATE

Sandy loam and acidic soil rich in organic carbon and nitrogen is found best for germination as well as for better survival of seedlings and productivity. Moist and partial sunny areas are found suitable for cultivation. Further moist rough wall surface provide suitable microhabitat for better growth. At lower altitude (1800-2200m) plain beds with slight tilt (5^0-10^0) are found suitable for cultivation unlike horizontal and vertical beds at alpine site.

NURSERY RAISING AND PLANTING

Seeds are sown during November-December in polyhouse at lower altitude, during March-April in open beds at middle altitude and during May in alpine area. Seedlings are transplanted after six to eight weeks in the field. At lower altitude root growth as well as number and length of leaves increases rapidly as compare to higher elevation. However, fibrous root formation take place only after third year of growth when, plants are raised by seedlings. About 44,000 plants are planted in one acre of land.

Vegetative propagation through splitting of roots is found most successful in *Nardostachys jatamansi* and observe better for multiplication as well as for higher production within a short period than cultivation through seedlings.

MANURE/FERTILIZER

For cultivation, better survival and yield of ***Jatamansi*** at lower altitude (1800m) 60-70qs. manure is required for one acre of land. However, the results are found best in litter treatment instead of live stock manure. The sites rich in organic carbon needed 46-60qs. manure per acre for higher yield. NPK (60:20:40) is also suggested.

IRRIGATION AND WEED CONTROL

Beds need excessive watering/irrigation to decrease the mortality rate. Watering requirement will change in respect of different months like no irrigation is needed during monsoon period. Watering requirement also depends on the location of sites and texture of soil. During the dry season i.e. May-June and September-October watering must be done at every two days interval at lower altitude. Weeding also depends on the condition of soil and presence of weeds. Generally weeding must be done at weekly interval in the first year of seedling growth and during the second and third year twice in a month.

HARVESTING/POST-HARVESTING

Plants should be harvested just before senescence after maturation to achieve the higher quantity of active contents. With a view to achieve higher amount of bio-active ingredients, it must be collected during the month of September at lower altitude while in the month of October at higher altitude. The harvesting period for this species is 3-4 years; the harvested roots are washed and dried in shade.

ECONOMICS

The rate for 01 kg. of rhizome/root ranges from Rs. 150-160.
(YEAR-2001)

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTE TO BE CONTACTED:

- **HIGH ALTITUDE PLANT PHYSIOLOGY RESEARCH CENTRE, HNB, GARHWAL UNIVERSITY, SRINAGAR (UTTARANCHAL)**

KALIHARI

Gloriosa superba Linn. Family –Liliaceae

A herbaceous tendril climber with underground cylindrical white tuberous rhizome; **leaves** sessile, alternate; **flowers** showy, solitary, at first greenish later becoming yellow and finally scarlet; **fruit** capsule containing many seeds.

COMMON NAMES: Malabar glory lily, Karihari.

DISTRIBUTION : Throughout India, upto 1800m. in low forest.

PART USED: Rhizome

CULTIVATION:

SOIL AND CLIMATE

Grows well in red sandy lomy soil, having pH 5.5 to 7 with good drainage. Crop requires hot and humid climate. It can be grown in tropical and sub-tropical regions upto 2400m.

NURSERY RAISING AND PLANTING

Grown by seeds and tubers but plants are best raised from tubers. Tubers are planted in the bed during rainy season, maintaining 60 x60cm. spacing. Plant requires support, as it is a climber. Approximately 41,500 tubers are required as planting material for one hectare of land.

WEEDING & HOEING

Periodical weeding and hoeing is required in nursery and field.

MANURE/FERTILIZER

15 Tons compost/Farmyard manure (FYM), 125kg. Nitrogen and 30kg K_2O_5 per hectare is required.

IRRIGATION

A rainfed crop but may be irrigated periodically as and when required.

HARVESTING/POST HARVESTING OPERATION

The fruits are harvested after 170-180 days of planting and dried in shade for 10-15 days. The tubers are harvested after 5-6 years of plantation, cut into small pieces and dried in shade.

YIELD:

250-300kg seeds per hectare annually and 2.5-3 ton/hectare tuberous roots after five years of the plantations.

ECONOMICS

Expenditure per hectare	Rs.1, 45,000/- (in five year)
Return per hectare	Rs.4.05 lacs
Net income	Rs.2.60 lacs
(YEAR-2001)	

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTE TO BE CONTACTED:

- **CIMAP, LUCKNOW**
- **UNIVERSITY OF AGRICULTURAL SCIENCES, BANGALORE**

KALMEGH

Andrographis paniculata Wall. ex Nees Family – Acanthaceae

A bitter annual (perennial, if maintained) herb, erect, 50 cm to 1m. in height, **stem** quadrangular, much branched; **leaves** opposite, short petioled; **flowers** in racemes. **Fruit** capsule linear, oblong or elliptic; seeds about 12 in number, sub-quadrate, brownish or creamy yellow.

COMMON NAMES: Hara-Chiretta, Kalmegh

DISTRIBUTION:

Widely distributed throughout plains of India from Uttar Pradesh to Assam, Madhya Pradesh, Tamil Nadu and Kerala.

PART USED: Whole plant

CULTIVATION:

SOIL AND CLIMATE

It can be cultivated in shady wastelands on wide range of soils from loam to later tic soils with moderate fertility.

The climatic requirement of the plant is hot and humid conditions with ample sunshine. With the onset of monsoon, plant grows luxuriantly and starts flowering with the moderation in temperature during September. Flowering and fruiting continues upto December until temperature drops drastically in Northern plains.

NURSERY RAISING AND PLANTING

Propagation is through shattered seeds in nature. Vegetative propagation is also possible in certain special cases through layering as each node is capable of producing enough roots. Seeds are small and remain dormant for five to six months. For raising crop in one hectare three beds of 10x2 m size should be tilled, pulverized and levelled during the month of May. Liberal use of organic manure in nursery is advised for raising healthy seedling. Very thin layer of soil and compost mixture should cover seeds. Beds should be covered properly by

suitable mulch and irrigated regularly with water fountain till seedlings emerge after 6-7 days.
Immediately after germination, mulch is removed to avoid elongation of the seedlings. After 10-15 days, regular flood irrigation given till ready for planting.

Transplanting of seedling is done in second fortnight of June at a row and plant spacing of 45 to 60 cm and 30 to 45 cm respectively. Beds should be irrigated immediately after planting.

THINNING AND WEEDING

To begin with one or two weeding/hoeing are essential to get the crop established. After establishment, crop grows well during monsoon and does not face any competition from weeds.

MANURE/FERTILIZER

Kalmegh can be grown on poor to moderate fertile soil but a provision of 80kg nitrogen and 40 kg $P_2 O_5$ will increase the herb yield. Nitrogen application may be splitted in two doses, which can be applied at an interval of 30 to 45 days. In addition 3-6 tonnes of well rotten farmyard manure is required for raising nursery.

IRRIGATION

Fairly distributed rainfall during monsoon is sufficient to raise annual crop in Northern states. But prior to rain 2-3 irrigations are required. Irrigation during autumn does not show much effect on biomass yield as by that time plant is in reproductive phase.

HARVESTING/POST HARVESTING OPERATION

Maximum herb biomass can be obtained in 90-100 days beyond which leaves start shedding. If crop is raised as annual crop and planted during the month of May June, it should be harvested by the end of the September when flowering is initiated. At the time of flower initiation, active principle, ***andrographolide*** is high in leaves. Since the whole plant contains active principles, entire harvested material is dried in shade and powdered.

YIELD

A well-maintained crop grown during monsoon season yields 3.5 to 4.0 tons of dried herb per hectare.

ECONOMICS

Expenditure per hectare	Rs.10, 000/-
Return per hectare	Rs.43, 000/-
Net income	Rs.33, 000/-

(YEAR-2001)

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTE TO BE CONTACTED:

- **CENTRE FOR ADVANCE STUDIES IN BOTANY, UNIVERSITY OF MADRAS, GUINDY CAMPUS, CHENNAI.**

Kalihari — *Gloriosa superba* Linn.

Makoy — *Solanum nigrum* Linn.

Kalmegh — *Andrographis paniculata* Wall. ex Nees

Kokum — *Garcinia indica* Chois.

Mulethi — *Glycyrrhiza glabra* Linn.

Pippal — *Piper longum* Linn.

KOKUM

Garcinia indica Linn. Family – Clusiaceae

A small to medium sized tree, **leaves** simple, dark green, elliptic ovate; **flower** in fascicles; **fruit** ovoid yellow or red when ripe.

COMMON NAMES: Konkam, Amrita, Vrasamla

DISTRIBUTION:

Found in Maharashtra, Goa, Karnataka, Kerala, South Gujarat, Assam and West Bengal.

PART USED: Ripe Fruit.

CULTIVATION:

SOIL AND CLIMATE

Grown in a variety of soil and in different agro-climatic conditions.

NURSERY RAISING AND PLANTING

Cultivated by soft wood grafting and planted in the month of July-August.

THINNING AND WEEDING

Weeding and thinning of the plants may be done as and when required usually after 15-20 days.

MANURE/FERTILIZER

20 kg Farmyard manure (FYM) + 500 gm N + 250 gm $P_2 O_5$ is required for better crop.

IRRIGATION

Normally grown as rainfed crop. Hence regular irrigation is not in vogue for grownup orchards.

HARVESTING/POST HARVESTING OPERATION

Harvesting is done in March-April. Fruits and Bark are removed and dried in shade.

YIELD

Ripe fruit 8.5 ton per hectare

ECONOMICS

Expenditure per hectare	Rs.13, 000/-
Return per hectare	Rs.47, 300/-
Net income per hectare	Rs.34, 300/-

(YEAR-2001)

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTE TO BE CONTACTED:

- **KERALA AGRICULTURAL UNIVERSITY, TRIVENDRUM**

KUTH

Saussurea Costus C. B. Clarke Family – Asteraceae *(Syn. S. lappa)*

A robust erect, perennial plant with large **leaves**. **Roots** stout up to 60 cm long and used medicinally. **Flowers & fruits**– August-September; **seeds** collected during September-October.

COMMON NAMES: Kuth, Kustha

DISTRIBUTION: Distributed and found in Himanchal Pradesh, Uttaranchal, Uttar Pradesh, Jammu & Kashmir, Sikkim & Arunachal Paradesh.

PART USED: Tuberous Root

CULTIVATION:

SOIL AND CLIMATE

Sandy textured loam soil, rich in moisture and organic carbon is best for germination as well as better survival of seedlings and productivity. The plant grows in temperate and sub-alpine region.

PLANTING

Cultivation and nursery of ***Kuth*** in Bio-edaphic condition at an altitude of 1200-1800 m is suitable. The seeds are sown in April or May in nursery. When the seedlings are $\pm$ 15 cm long, these are transplanted in fields.

IRRIGATION

The crop requires 5-6 irrigations between May-September. The land is irrigated when seeds are sprouting.

MANURE/FERTILIZER

Well-decomposed farmyard manure should be applied to nursery beds and in the field at the time of field preparation.

HARVESTING/POST-HARVESTING

Usually in 2-3 years well-grown mature root tubers are developed. However, yield is obtained from 3 years old crop. Root is harvested in early September or October or early spring. The roots are cleaned with water and dried for processing.

YIELD

After 2-3 years of planting about 200-300 kg. of dry tuberous roots per hectare can be obtained. The market rate is Rs.80-90 per kg.

ECONOMICS

Expenditure per hectare	Rs.14, 000/-
Return per hectare	Rs.45, 000/-
Net income per hectare	Rs.31, 000/-
(YEAR-2001)	

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTE TO BE CONTACTED:

- HERBAL GARDEN, HERBARIUM & RESEARCH INSTITUTE, JOGINDER NAGAR, GOVT OF H. P. (HIMACHAL PRADESH)
- INSTITUTE OF HIMALAYAN BIO-RESOURCE, TECH., POST BOX NO.6, PALAMPUR (HIMACHAL PRADESH)

KUTKI

Picrorhiza kurrooa Benth ex Royle Family - Scrophulariaceae

A small nearly hairy perennial herb with an elongated creeping stolons from root stock; **leaves** spathulate, serrate; **flowers** white or bluish in dense terminal spicate raceme; dried **rhizome** cylindrical, deep greyish brown in colour and longitudinally wrinkled with annulations at the tip.

COMMON NAMES: Katuka, Kuru, Katvi, Katurohini & Katki

DISTRIBUTION: Found in the Himalayas, from Kashmir to Sikkim at an elevation of 2,700-4,500 m. hills of Himachal Pradesh, Uttaranchal, Uttar Pradesh, Jammu & Kashmir, Sikkim and Arunachal Paradesh. It can be cultivated between 1800 m to 2800 m. altitude

PART USED: Root, Rhizome

CULTIVATION

SOIL AND CLIMATE

Sandy textured loam soil is best for the cultivation of the plant. Site rich in organic carbon and high moisture contents is needed for cultivation. Further partial shade areas (Canopy of small shrubs) are found good for maximum growth and productivity.

NURSERY RAISING AND PLANTING

Seeds sown in upper soil surface in seedling trays and covered with thin layer of moss increase the germinability of seeds. Moss layer retains moisture and avoid water splash of the seeds sown. This condition enhanced the seed germinablity upto 52 and 58% at lower altitude inside polyhouse. Seeds are sown during November-December in polyhouse at lower altitude, during March-April in beds at middle altitude (2200m) and during May in alpine area. Seedlings raised at lower altitude are transplanted in nursery beds at least for 6 months by raising seedlings at lower altitude in winter and transplanting them at higher altitude during spring.

About 44,000 plants are usually planted in one acre of land. Intercropping with 'Saunf' can give better yield, which provide suitable microclimate to growing plants of *P. kurrooa* by providing moisture for long time under its

canopy. Intercropping with economically viable plants for the area viz. potato and *Foeniculum vulgare* (sanuf) were most suitable. Further intercropping with *Digitalis purpurea* has also been suggested.

Vegetative propagation was done successfully through stolon segments by simple method viz., water dip treatment and use of high moisture trenches for rooting of stolon cuttings, which can be easily used, for cultivation purpose by local growers. Top segments of stolons were found more suitable for multiplication. Cuttings were kept under soil in trenches or covered with moss with high moisture content, 90% rooting was observed in top segments after 2 weeks.

MANURE/FERTILIZER

Manuring is recommended during winter months or before transplanting. In general, maximum manure 60-70 q/acre is required at lower altitude and 40-46 q/acre at middle altitude to achieve best production for three years. However, at sites rich in organic matter only 18.04-q/acre manure is required for three years.

IRRIGATION

Beds needed excessive watering/irrigation to decrease the mortality rate. At early developmental stage of seedlings in beds, as well as stolon cuttings need watering after every 24 hrs at lower altitude (1800 m.). Generally watering should be done at two days interval during winter months.

WEEDING

Weeding of crop is done at weekly intervals during first year of cultivation and at monthly interval during the second and third year at both the altitudes. It also depends on the condition of soil and presence of weeds.

HARVESTING/POST-HARVESTING

After completion of reproductive phase, plants become mature for harvesting and contains good percentage of active contents. Time of completion of reproductive phase differs with the difference in altitude where the plants are growing. Generally the plants in alpine areas complete their reproductive phase during the month of September-October while the plants at lower altitude complete their reproductive phase during the month of September. During senescence of aerial parts, plants should be harvested to achieve the high quantity of active content. To take the maximum amount of bioactive ingredients

harvesting should be done during the months of September at lower altitude while in the months of October at higher altitude.

YIELD

The average yield is 450 kg/ha and maximum 612 kg/ha from high dose of forest litter treated field.

ECONOMICS

The rate for 01 kg of rhizome /roots ranges from Rs. 120-150.
(YEAR-2001)

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTES TO BE CONTACTED:

- **HIMACHAL PRADESH KRISHI VISHWA VIDYALAYA, PALAMPUR (HIMACHAL PRADESH)**
- **HIGH ALTITUDE PLANT PHYSIOLOGY RESEARCH CENTRE, HNB GARHWAL UNIVERSITY, SRINAGAR (UTTARANCHAL)**

MAKOY

Solanum nigrum Linn. Family - Solanacea

An erect herb 30-60 cm high with small white **flower** and green berries (fruits) turns red or black on ripening. **Seed** discoid, smooth yellowish. Flowering & fruiting - August to October. It grows as a weed throughout dry parts of India.

COMMON NAMES: Gurkkamai, Kakamaci, Black nightshade, Mako, Inabus salab.

DISTRIBUTION: Throughout dry parts of India up to 800 m altitude.

PART USED: Whole Plant & Fruit

CULTIVATION:

SOIL AND CLIMATE

The plant grows in different kinds of soil including dry, stony, shallow or deep soils. It usually grows in moist habitat in wastelands as weed. It can be cultivated in tropical and sub-tropical agro-climatic regions.

NURSERY RAISING AND PLANTING

The seeds are sown during April-May in well-manured nursery beds. It takes about 15-30 days to grow. The seedlings are developed in about 20-30 days after sowing. The seedlings are transplanted in rows and 60 x 60cm apart in the well-prepared field.

WEEDING AND HOEING

Periodic hoeing is done, both in the nursery and field as per requirement.

IRRIGATION

The nursery beds and plantation should be irrigated periodically as and when required weekly or fortnightly. The plants are irrigated till it flowers.

HARVESTING/POST-HARVESTING

The crop is usually ready for harvesting after 4-6 months depending upon the climate and soil. The plants are collected and dried in shade.

ECONOMICS

The rate for 01 kg of dried whole plant ranges from Rs.20-25 and fruits Rs.45-50.
(YEAR-2001)

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTE TO BE CONTACTED:

- **HERBAL GARDEN, HERBARIUM AND RESEARCH INSTITUTE IN ISM, MANALI-PATHANKOT HIGHWAY, GOVERNMENT OF H.P.,JOGNDER NAGAR DIST. MANDI-176 061 (HIMACHAL PRADESH)**

MULETHI

Glycyrrhiza glabra L. Family –Fabaceae

A perennial under shrub, reaching up to 1.2 m height under favourable growing conditions in nature. The root crown gives out a number of long woody stems which bear compound pinnate **leaves**. **Flowers** pale-blue in colour and are borne at the age of 2/3 years and onwards. **Fruit** 2 to 2.5 cm long pods containing 2 to 5 seeds.

COMMON NAMES: Liquorice, Yestimadhu & Aslusoos

DISTRIBUTION:

This species is widely distributed in the world from 5^0W to 100^0E longitude and 20^0 to 50^0 N latitude. It is reported abundant in Western China, parts of Asia, Minor Persia, Asian Republics of erstwhile U. S. S. R. and Afghanistan. It is also cultivated in Punjab & Sub Himalayan tracts in India.

PART USED: Root.

CULTIVATION:

SOIL AND CLIMATE

Mulethi is a hardy plant and occurs in nature on rich forest soils, acidic to slightly alkaline soils (pH 5.5 to 8.2). It inhabits dry cold temperature to Mediterranean climates where annual temperature varies from 25^0C summer and 5^0C in winter season.

Sandy loam fertile soils having pH of 6 to 8.2 have been found to promote better root development in India. The plant thrives in locations receiving 50-100 cm of rainfall annually and cultivation supported with irrigation; irrigation is beneficial for higher root yield.

NURSERY RAISING AND PLANTING

This is a long duration crop and the preparation of field should be of good tilth and the fields be levelled well to avoid stagnation of water. The cuttings of the underground stem/root of 15-25 cm possessing 2-3 eye buds are planted directly in the field 6-8 cm deep in the soil at a distance of 90 x 45 cm. Besides

this the rows may be raised 45-60 cm to facilitate irrigation. It should be planted at 60x45 cm spacing. In this manner 250-300 kg of wet weight of stem cutting is required for plantation of one-hectare land. The cuttings begin sprouting in 15-20 days after planting. Light and frequent irrigation is necessary during spring planting until the cuttings sprout and establish themselves in the field. Fresh planting can be raised during February-March or July-August.

THINNING AND WEEDING

Three to four hoeing cum weeding are required in the first year of planting and in subsequent years two hand weeding-cum-hoeings are considered to keep the fields weed free for healthy growth of plants.

MANURE/FERTILIZER

Farmyard Manure (FYM) has been found useful for good development and growth of underground roots and should be applied at the rate of 10 tonnes per hectare at the time of field preparation. The crop has not shown response to higher dose of N-fertilizers despite it forming dense crown of leaves during vegetative growth.

IRRIGATION

The crop requires irrigation at an interval of 30-45 days in dry summer season. The plant sheds leaves in November and no irrigation is given throughout winter season. In all 7-10 irrigation are given to the crop. It is important to avoid water-logging in field as stagnation of water in the field will cause-root rotting due to infection of soil borne diseases.

HARVESTING/POST HARVESTING OPERATION

It is found that high yields are obtained from 2-½-3 year old crop Manual digging is performed for harvesting roots but is found very costly. One disc harrow for digging has proved successful and is highly economical. It overturns the soil, which is left in field for sun drying; later the roots are sorted out and cleaned. The crop is harvested in winter season i.e. November or December month to obtain roots of high glycyrrhizic acid.

At harvest, the roots contain 50-60 percent moisture and should be dried in the sun for 2-3 days and then in shade for next 10-12 days. The dry roots should possess not more than 10% moisture when these are ready to be stored in polythene-lined bags. The roots are cut into pieces of convenient size and sorted into grades, based on thickness.

YIELD

The yield of dry root at Hissar (Haryana) is recorded between 70 to 80 q/hectare at Anand (Gujarat) 10 to 20 months crop has given an average yield of 20 to 25 q/ hectare

ECONOMICS

Return Rs.3, 50,000/- to 4,00,000/-per hectare
(YEAR-2001)

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTE TO BE CONTACTED:

- **DEPARTMENT OF PLANTS BREEDING, CHAUDHARY CHARAN SINGH AGRICULTURE UNIVERSITY HARYANA, HISSAR –125004 (HARYANA)**

MUSALI SAFAID

***Chlorophytum arundinaceum* Baker** **Family - Liliaceae**
***C. borivilianum* Santapau**

A herb with linear **leaves** appearing over ground with the advent of summer rains. **Flowers** white. It is propagated through rootstocks.

COMMON NAMES: Safaid Musli.

DISTRIBUTION: Foot Hills of Uttaranchal, Himachal Pradesh & Uttar Pradesh, Madhya Pradesh, Tamil Nadu, Kerala, Karnataka, Rajasthan, Gujarat and Maharashtra.

PART USED: Tuberous Root

CULTIVATION:

SOIL AND CLIMATE

Safed Musli requires well drained loamy to sandy loam soils rich in organic matter. Warm and humid climatic condition with good amount of soil moisture during the growing season favour luxuriant vegetative growth and facilitate fleshy root development.

NURSERY RAISING AND PLANTING

It could be propagated through seeds as well as by vegetative means (root-stock bearing buds or growing points).

By seeds: The seeds are black in colour and with angular edges. It takes 12-16 days to sprout. The seeds should be sown in a very well prepared seedbed, which is heavily manured by using FYM, or leaf litter in the first or second week of June and adequate moisture should be continuously maintained during absence of rain in the early monsoon season. The seedlings can be transplanted in the field during the next Kharif season only at 30 x15 cm spacing because the development of plants as well as roots by means of seeds in the first year is not vigorous enough as compared the vegetatively propagated plants.

Vegetative propagation: The initiation of sprouts of fleshy roots starts in mid May but sometimes it could be as early as the last week of April in stored material. In the forest seedlings emerge out from the ground within 4-6 days after

receipt of rains. However, for the purpose of raising plants in the field either the sprouted seedlings should be collected from the forest between 10 to 30 days after receipt of rains and transplanted in the field or fleshy root bunches should be taken out from the ground or storage place in mid of May.

Even a small, 1 cm long and slightly shrinken fleshy roots or rootstocks have a capacity to reproduce into new plants. These fleshy roots sprout from second week of May to second week of June. The sprouted fleshy propagules should be planted in the field in first or second week of June, followed by irrigation. The practice of planting on top of the ridges of 15-20 cm height at a row distance of 30x15 cm is found adequate for obtaining commercial yield. It is estimated that 250-300 kg of rootstocks will be required for planting one-hectare land. Musli Safaid could be easily intercropped in between maize rows.

Manure/Fertilizer

The use of 10-15 ton of Farmyard Manure (FYM)/hectare provides good nutrient status to the substratum for supporting healthy plant growth.

Irrigation

The crop may be sown after receipt of rains. If there is no rains after sowing of fleshy root propagules and its transplanting then one irrigation be provided immediately. Later, when soil moisture has receded in the fields, irrigation may be done after 10 to 15 days interval.

Weeding

One to two weeding-cum-hoeings are needed to keep the soil porous and free of weedy growth.

Harvesting/Post-harvesting

The crop matures in about 90 days under cultivation. At maturity the leaves start yellowing and ultimately dry up from the collar part and fall down. The crop could thus be harvested when leaves have dried which occurs in the months of September/October. During digging of plants, fleshy root bunches should be lifted form the soil. The harvested fleshy roots are cleaned and is removed and white musali tubers are dried spread in the shade for about 4-7 days to dry-out its moisture.

Yield

About one ton of fleshy root per hectare, is collected. This, after processing and drying is reduced to 200 kg.

Economics

Expenditure per hectare.	Rs.9, 25,000/-
Return per hectare	Rs.1, 62,5000/-
Net income	Rs.7, 00,000/-
(Year 2001)	

Note: Market for medicinal plants is volatile and the economics may vary.

Institutes to be Contacted:

- **Regional Research Laboratory (CSIR), Jorhat (Assam)**
- **Tropical Forest Research Institute, Mandla Road, Jabalpur (Madhya Pradesh)**
- **CEDMAP, 60, Jail Road, Jahangirabad, Bhopal (Madhya Pradesh)**

PASHAN BHEDA

Coleus barbatus Benth. Family –Lamiaceae

An erect profusely branched aromatic, annual up to 1.5m high. **Flowers** in racemes. **Root** well developed.

COMMON NAMES: Coleus, Makkari beru, Gundeer, Pakhan Bed and Juntiyana.

DISTRIBUTION : Rajasthan, Maharashtra, Karnataka, Tamil Nadu and Madhya Pradesh.

PART USED: Roots

CULTIVATION:

SOIL AND CLIMATE

It grows well in red sandy loam soil. A soft soil having pH 5.5-7 with low moisture contents is reported to be ideal for rich growth of plants. Plants grow well in hot, humid climate and tropical and sub tropical situation under irrigation.

NURSERY RAISING AND PLANTING

Coleus can be grown by seeds and cuttings both. The plants are best raised from stem cuttings. 10 to 12 cm long stem selected and planted in well manured nursery bed during May- June months. The cuttings initiate sprouting and grow well within a months. These rooted plants are suitable for planting in the field during rainy seasons (July-August) at the distance of 20 x 20 cm. Approximately 33,600 stem cuttings are required for one acre of land.

WEEDING & HOEING

Weeding and hoeing is to be done at regular interval.

MANURE/FERTILIZER

Composed/Farmyard Manure (FYM) four tons/acre is required.

IRRIGATION

Watering is necessary every third day at initial stage of plantation. After establishment, plants are to be irrigated as and when required weekly or fortnightly.

HARVESTING/POST HARVESTING OPERATION

The crop matures in about 150 days under cultivation. The crop could thus be harvested in the month of November/December. During digging of plants, roots should be lifted from the soil. After digging, the roots are cleaned and cut into small pieces for convenience in drying and storage. The dried roots are stored in polythene lined gunny bags.

YIELD

Approximately 600 to 1000 kg dry roots/ acre.

ECONOMICS

Net income =Rs.50,000/- to 75,000/- per hectare.
(YEAR-2001)

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTE TO BE CONTACTED:

- UNIVERSITY OF AGRICULTURAL SCIENCES, BANGALORE
- TAMIL NADU AGRICULTURAL UNIVERSITY, COIMBATORE

PIPPAL

Piper longum Linn. Family – Piperaceae

A glabrous under-shrub with erect or sub-scandent nodose **stem** and slender branches. **Leaves** are simple, alternate, stipulate and petiolate or nearly sessile. Flowering is nearly through out the year; inflorescence spike; **fruit** greyish green or darker grey berries.

COMMON NAMES: Peppali, Pipli, Long pepper and fifildaraz.

DISTRIBUTION:

A native of Indo-Malayan region. It grows wild in the tropical rain forests of India.

PART USED: Roots and dried spikes.

CULTIVATION:

SOIL AND CLIMATE

Long pepper can be cultivated successfully in organic matter rich fertile, well-drained forest soils. Laterite soils with high organic matter content and moisture holding capacity are also suitable for cultivation. Optimum elevation for its cultivation is between 100 to 1000 m. Higher elevations are not conducive to high yields. It needs partial shade for its ideal growth. Partial shade 20- 25 per cent shade intensity is found to be the optimum.

LAND PREPARATION

The area should be ploughed two to three times and levelled properly. Raised beds of size 3m x2.5 m are prepared and pits are dug at a distance of 60 cm x 60 cm and dried cow dung or farmyard manure at the rates of 100 g per pit is applied and mixed with soil. Two rooted cuttings or suckers with roots are planted in each pit. To avoid any water stagnation in beds, channels are laid out to drain excess rainwater.

NURSERY RAISING AND PLANTING

It is propagated by suckers or rooted vine cuttings. Vine cuttings and suckers are transplanted soon after the setting in of monsoon rains. The best time for raising nursery is during March and April to avoid mealy-bug attack on roots, 10 percent DP is to be mixed with the potting mixture. Normal irrigation may be given on alternate days. Excess moisture in the nursery can cause *Phytophthora* wilt. By the end of May, the cuttings will be ready for planting.

THINNING AND WEEDING

In first year regular weeding should be done as and when the weed growth is noticed in beds.

MANURE/FERTILIZER

Long pepper needs heavy manuring. In soils with low fertility, the growth of the plant is very poor. Twenty tonnes of cow-dung or farmyard manure is required for a hectare of land. Since the crop will give economic yield for 3 years, the manuring has to be done each year. During the first year organic manure can be applied in pits at the time of field planting. In subsequent years, manuring is done by spreading it in beds and covering with soil. Application of organic manure increases the water holding capacity of the beds.

IRRIGATION

Irrigation once in a week is necessary as an intercrop and if the main crop is irrigated no additional irrigation is necessary for Pippal (Piper longum). When the crop is not irrigated, it is necessary to give mulch with dry leaves or straw during summer months. If the crop is irrigated during summer, it continues to produce spikes and off-season produce will be available.

HARVESTING/POST HARVESTING OPERATION

The vines start bearing spikes six months after planting. The spikes thus will be ready for harvest after two months since formation of spikes. When the spikes are full grown but unripe, these are gathered. If left without picking, they ripe and their pungency is lost to a great extent.

Harvested spikes are repeatedly exposed in the sun for 4 to 5 days until they are perfectly dry. The green spike to dry spike ratio is around 10:1.5. The dried spikes have to be stored in moisture proof containers. Thicker parts of lower stems/roots are cut and dried for producing **Piplamool**. There are three

grades of Piplamool. The grade I with thick roots and underground stem marketed at higher price than grade II and or III, which comprises either their roots, stem or broken fragments.

YIELD

The yield of dry spike during first year is around 400/kg/hectare it increases up to 1000 kg/hectare in the third year. After third year, the vines become less productive and should be replanted.

ECONOMICS

Net income = Rs.1, 00,000/- to 1,50,000/- per hectare/year
(YEAR-2001)

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTE TO BE CONTACTED:

- DIRECTOR,
  AUSHADHI AVAM SUGANDHIYA VANASPATI ARIYOGANA, MAHATMA PHOLE KRISHI VIDYAPITH, RUHARI, DIST.
  AHMADNAGAR-413722,
  (MAHARASHTRA)

RASAUT *
(DARUHALDI)

***Berberis aristata* DC. Family – Berberidaceae**

An erect spinous shrub, 2-6 m high, often forming gregarious patches, pale yellowish brown bark, closely and rather deeply furrowed. **Flowers** golden yellow.

COMMON NAMES: Rasaut, Daruhaldi

DISTRIBUTION :

Occurs in the Himalayas between 2000-3000 m height and also in Nilgiri Hills.

PART USED: Root bark, Stemwood and Fruit.

CULTIVATION:

SOIL AND CLIMATE

It can be cultivated in any type of soil. Grows well in temperate climate.

NURSERY RAISING AND PLANTING

Propagation is from seeds, self-sown in nature. Seedlings or cuttings can be taken during spring, season after the berries are over. Seedlings are transplanted in the field at distance of 100 x 100 cm.

THINNING AND WEEDING

Weeding and thinning of the plants may be done as and when required usually after 15-30 days for better growth.

MANURE/FERTILIZER

Compost/Vermi compost, organic manure is preferred.

* Rasaut is commercial extract of the plant

HARVESTING/POST HARVESTING OPERATION

The root bark is removed from mature plant after two years of plantation & cut in small pieces and dried in shade.

ECONOMICS

The rate for 01kg of bark ranges from Rs.40-50.
(YEAR-2001)
Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTE TO BE CONTACTED:

- **HERBAL GARDEN, HERBARIUM & RESEARCH INSTITUTE, JOGINDER NAGAR, GOVT. OF HIMACHAL PRADESH, SHIMLA (HIMACHAL PRADESH)**

SARPAGANDHA

***Rauwolfia serpentina* Benth. ex Kurz** **Family - Apocynaceae**

An erect **evergreen**, perennial **under-shrub**, 75 cm to 1 m. in height. **Root** is prominent, tuberous, usually branched, 0.5 to 2.5 cm in diameter. Up to 40 to 60 cm deep into soil. The roots possess high alkaloid concentration.

COMMON NAMES: Candrabhaga, Chota chand, Serpentina root, Chandrika & Asrol

DISTRIBUTION: Foot hills of Himalayan range, up to the elevation of 1300-1400 m. and almost throughout all over the country. Lowers hills of Himachal Pradesh, Uttaranchal, Uttar Pradesh, and Jammu & Kashmir etc.

PARTS USED: Root

CULTIVATION:

SOIL AND CLIMATE

The plant requires slightly acidic to neutral soils for good growth with medium to deep well drained fertile soils. Clay-loam to silt-loam soils, rich in organic content are suitable for its commercial cultivation. It grows well in frost-free tropical to sub-tropical situations under irrigation.

NURSERY RAISING & PLANTING

The crop can be propagated by seed, stem cutting and root cuttings. Seed propagation is the best method for raising commercial plantation.

By root cutting: Nearly 5 cm long root cutting are planted during nearly spring season in nursery beds containing well matured Farmyard Manure (FYM), sand and sawdust. The beds are kept moist through watering. The cuttings begin to sprout within 3 weeks. These can be planted in field during rainy season after 8 to 10 cm rains are received; the seedlings are transplanted at 45 cm row to row and 30 cm plant-to-plant distance. In this manner, an estimated 100 kg of root cuttings are found sufficient for planting one-hectare area.

By stem cuttings: Hard wooded stem cutting measuring 15 to 22 cm are closely planted during June in the nursery beds where continuous moisture is

maintained. After sprouting and giving out roots, these plants are transplanted in the main field at given spacing.

By root stumps: About 5 cm of roots, intact with a portion of stem above the collar, are directly transplanted in the field having irrigation facilities.

By seed: Seed germination in *Rauwolfia* is highly variable. It is reported to vary from 5 to 30 percent even when only heavy seeds are chosen for sowing purpose. Light and heavy seeds can easily be separated by simple water flotation. Germination of heavy seeds during May-June after soaking them in water for 24 hours was 20-40 per cent and 62.77 percent germination was recorded in freshly collected heavy seed lot. In all, 6 kg of seeds are sufficient to raise one-hectare plantation.

In Maharashtra and Madhya Pradesh, April end, in West Bengal first week of May or little later, and in Jammu & Dehradun during third week of May are found to be most suitable time for sowing seed in the nursery. The nursery is prepared by raised beds of 10x10 m. dimension under partial shade made up of one-third of well matured FYM and leaf mould, and two-third amount medium of silt-loam soil. About 500 sq m. seedbeds area is sufficient for raising seedlings and enough for planting one-hectare land. The seeds are sown, 2-3 cm apart in rows in shallow furrows during April end. The furrows are then covered with a fine mixture of soil and FYM. Keep the beds just moist by light watering. Germination starts after 15-20 days and continues up to 30 to 40 days. Seedlings are ready by mid-July for transplanting. The seedlings are transplanted at 30 cm distance within the rows spaced at 45 cm. If rains are not received during or immediately after transplantation irrigation is necessary for better growth. *Rauwolfia* is long duration (18 months) and slow growing crop particularly in the initial stage; thus different intercrops have been tried.

Manure/Fertilizer

Farmyard manure at (20 to 25 q/hectare) is required for land preparation has given good response by the crop. Fertilizer trials have made it evident that *Rauwolfia* responds favourably to nitrogen, phosphorus and in some part to potash application.

Irrigation

Rauwolfia, if grown in the areas which receive rainfall of 150 cm or above well distributed throughout the growing season such as in Assam and Kerala, can be raised and rainfed crop under subtropical conditions. It needs regular irrigation where temperature rise high combined with low rainfall during rainy season. It is

suggested that 15 to 16 irrigations, at 20 days interval in summer and at 30 days interval in winter are sufficient.

Weeding

The *Rauwolfia* field should be kept relatively weed-free in the early period of growth. This means giving two to three weedings and two hoeings in the first year where sole *Rauwolfia* crop is taken or 5-6 weeding where intercrops in *Rauwolfia* are practised.

Harvesting/Post-harvesting

Root yields at different age and climate has shown that 18 months duration crop produce maximum root yield. Transplanting is done in July; the harvesting period coincides with the shedding of leaves during early autumn season next year. At this stage, the roots contain maximum concentration of total alkaloids. At harvest the root may be found to go up to 40 cm deep in the soil. Digging up the roots harvesting and thin roots are also collected.

After digging the roots are cleaned, washed and cut into 12 to 15 cm pieces for convenience in drying and storage. The dry roots possess upto 8-10 per cent of moisture. The dried roots are stored in polythene lined gunny bags in cool dry place to protect it from mould.

Yield

On an average, root yield vary from 15 to 25 q/hectare of dry weight under irrigation depending upon soil fertility, crop stand and management.

Economics

Expenditure per hectare	Rs.19, 000/-
Return per hectare	Rs.60, 000/-
Net income	Rs.41, 000/-

(Year-2001)

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTE TO BE CONTACTED:

- REGIONAL RESEARCH LABORATORY JAMMU TAWI (JAMMU & KASHMIR)
- CENTRAL INSTITUTE OF MEDICINAL & AROMATIC PLANTS (CIMAP), LUCKNOW (UTTAR PRADESH)
- TROPICAL FOREST RESEARCH INSTITUTE, MANDLAR ROAD, JABALPUR (MADHYA PRADESH)

SENNA

Cassia angustifolia Vahl. Family – Caesalpiniaceae

A small perennial shrub of less than a metre in height ascending branches. The leaves are compound pinnate, petiolate about 10 cm long and bear 5-8 pairs of leaflets each on a small stalk.

COMMON NAMES: Sanai, Marknadi, Sonmukhi & Sana

DISTRIBUTION:

The plant is found growing in a wild state, certain coastal parts of Gujarat especially in the Bhuj region of India.

PART USED: Leaves and Pods.

CULTIVATION:

SOIL AND CLIMATE

The crop can thrive on a variety of soils, but is largely grown on red loams, on alluvial loams. The texture of the soil which account for the major hectarage under senna crop varies from sandy loam to loam, while the black cotton soils are heavier and more fertile. The average pH ranges from 7 to 8.5. It is very sensitive to water logging. Hence, grown only on well-drained soils.

Senna is a warmth-loving crop and requires bright sunshine for its successful growth. It can be grown in early summer (February - March) or in winter (October – November) crop. Whereas under North Indian conditions like Delhi and Gujarat, where the rainy season is short, it is reported to be the ideal time as the plants put on luxuriant growth and give the maximum growth. Heavy rains and cloudy weather during growth are harmful to the crop. An average rainfall of 25-40 cm. distributed from June to October is sufficient to produce good crop.

LAND PREPARATION

The land is ploughed deep and the soil is exposed to sun for 110-115 days to dryout roots of perennial weeds followed by two cross ploughing harrowing and levelling. Farm-yard-manure (FYM) is incorporated into the soil at the time

of final cross ploughing. Then the land is laid out into plots of convenient size with irrigation channels.

Nursery Raising and Planting

Seeds raise the crop. The seeds have hard and tough seed coat. Soaking seeds for 10-12 hours before sowing was reported not only to give 100 per cent germination. About 20 kg of seeds are required to cover a hectare of land.

The seeds are broadcasted or preferably sown at 30 cm lines to 30 cm apart and 1.5 to 2.5 cm depth in a well-prepared land. Germination commences on third day and completed within a fortnight. Before sowing the seeds, the field should be perfectly levelled otherwise it hampers the uniform seed germination. It is found that the seed treatment with Thiram, Captain or Agroson G. N. at 2.5 g/kg protect the seedlings from damping off and seedling blight diseases which are very common.

Thinning and Weeding

The first weeding cum hoeing is done at 25-30 days of sowing and second at 75-80 days and third at 110 days to keep the crop free from weeds. Use of Teeflan herbicide as pre-emergent spray at the rate of 4 kg/hectare has been reported to increase the yield and anthraquinone content.

Manure/Fertilizer

4-5 cart loads (5-10 tonnes) of well rotten FYM per hectare is required. In general, where specific soil nutrient status of the field is not readily found, 80 kg each of P_2O_5 and K_2O may be applied per hectare for the higher production of leaf, pod and total alkaloids. Of these, entire dose of Phosphorus and Potassium and 50 per cent of Nitrogen should be applied at the time of sowing and the remaining 50 per cent of Nitrogen has to be applied at 90 days after sowing.

Irrigation

Senna could be economically grown under rainfed conditions. In most years, the crop needs no irrigations except under the conditions of prolonged drought. However, when it is grown as a semi-irrigated crop, the yield increased considerably. About 5-8 light irrigations are enough to raise a good crop of *Senna*, however, heavy irrigations are injurious to the crop.

Harvesting/Post Harvesting Operation

Senna plant produces foliage containing higher sennosides between 5-90 days age, depending upon the total plant growth. The picking of leaves is done by hand so that most of the growing tops are removed at harvest. This also induces the plants to produce more of branching which otherwise reduce foliage growth considerably. A second picking is taken at 90-100 days and the third picking between 130-150 days when the entire plants are removed so that the harvested material includes both leaves and pods together.

The harvested crop should be spread over open field area in a thin layer to reduce its moisture. Further drying of produce is done in well-ventilated drying sheds. It takes 10-12 days to dry completely in well-ventilated drying sheds. The dried leaves and pods should have light green to greenish yellow colour. A rapid mechanical drying at 40^0 C could also be attempted. The produce is baled under hydraulic pressure and wrapped in gunny bags, for export or domestic consumption.

Yield

A good average crop of *Senna* can give 15 quintals of dry leaves and 7 quintals of pods per hectare under irrigated and good management conditions. The yield under rainfed conditions is about 10 quintals of leaves and 4 quintals of pods.

Economics

Expenditure per hectare	Rs.07, 000/-
Return per hectare	Rs.37, 500/-
Net income	Rs.30, 500/-

(Year-2001)

Note: Market for medicinal plants is volatile and the economics may vary.

Institute to be Contacted:

- **Utthan Centre for Sustainable Development & Poverty Alleviation 18-A, Auckland Road,Allahabad-211001 (Uttar Pradesh)**
- **NBPGR, New Delhi**
- **CAZRI, Jodhpur**

SHATAVARI

Asparagus racemosus Willd. Family - Liliaceae

A perennial, prickly climber excessively branched, **Roots** tuberous 15-40 cm long, greyish-white and cultivated both for medicinal & ornamental purpose.

COMMON NAMES: Satamuli, Satavar, Abhiru & Stavari

DISTRIBUTION: Found throughout India in the tropical & subtropical parts up to 1200 m. wild or cultivated.

PART USED: Tuberous Root

CULTIVATION:

SOIL AND CLIMATE

Plant usually grows in a variety of soils including medium black having pH 7-8, It can be easily grown in sub-tropical & sub-temperate agro-climatic regions up to 1400 m.

LAND PREPARATION

The soil is given 20-30 cm deep ploughing followed by 2-3 harrowings after few days. Grasses and weeds are removed. The land is properly levelled and 40-45 cms broad ridges are prepared for plantation, leaving 15-20 cms furrow space as a channel for irrigation.

NURSERY RAISING AND PLANTING

Seeds are sown in April in raised beds at 5 cms apart to facilitate decay of its hard seed coat by the time monsoon commence. Germination starts in 8 to 10 days after the first shower of monsoon in June. The seedlings are transplanted on ridges at 60 x 60 cms apart and provided bamboo stakes when the plants attained a height of 45 cms.

Vegetative propagation is by division of rhizomatous disc present at the base of the aerial stem. The rhizomatous disc develops several vegetative buds around the aerial shoots. The disc is divided in such a way that each piece possessed at least two buds along with 2-3 tuberous roots. These pieces are

planted, covering the buds with 1 cm of soil followed by irrigation. The sprouting commences in 8-10 days after plantation.

WEEDING

Two weedings are carried out during the rainy months, thereafter one in next 2-3 months.

IRRIGATION

Irrigation is done after the rainy season is over, at the rate of two irrigations in winter season and one per month in summer season.

MANURE/FERTILIZER

The crop responds to use of both manures and fertilizer. Organic manures are preferred and should invariably used. The crop does not have any specific requirement of NPK.

HARVESTING/POST HARVESTING

The plants are harvested after 40 months in winter. The roots are dug-out collected and cleared. The roots are peeled off with the help of sharp knife immediately after harvesting. It is observed that in case the roots are not peeled off within a few days, it is a bit difficult to remove the skin as such. In such a condition the roots are kept in boiling water for about 10 minutes, followed by cold-water treatment to facilitate peeling. After removing the skin, it is cut transversely into small pieces and dried in shade.

YIELD

The average yield is reported to about 2607 gms fresh weight per plant after 40 months age. Estimated yield of 5-7 tons/hectare dry roots is reported Precaution may be taken for rodents and rats which occasionally eat tender shoots.

ECONOMICS

Expenditure per hectare	Rs.10, 027/-
Return per hectare	Rs.36, 000/-
Net income per hectare (YEAR-2001)	Rs.25, 973/- approx.

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTES TO BE CONTACTED:

- **N. B. P. G. R. (HEAD QUARTER),**
  INDIAN AGRICULTURE RESEARCH INSTITUTE, PUSA CAMPUS, NEW DELHI

- **JAMIA HAMDARD,**
  HAMDARD NAGAR, NEW DELHI

Rasaut (Daruhaldi) — *Berberis aristata* DC.

Sarpgandha — *Rauvolfia serpentina* Benth. ex Kurz

Senna — *Cassia angustifolia* Vahl.

Tulsi — *Ocimum sanctum* Linn.

Shatavari — *Asparagus racemosus* Willd.

Vai Vidang — *Embelia ribes* Burm. f.

TULSI

***Ocimum sanctum* Linn.** **Family – Lamiaceae**

An annual plant, 30-60cm high, much branched; **stem** and branches usually purplish, sub-quadrangular; **leaves** 2.5-5 by 1.6-3.2cm, elliptic oblong-obtuse, pubescent on both side and minutely gland-dotted. **Flowers** in racemes.

COMMON NAMES: Holy Basil, Krishna Tulsi

DISTRIBUTION: Found all over the country.

PART USED: Leaf, Whole plant, Seed

CULTIVATION:

SOIL AND CLIMATE

Thrives well on variety of soils. Rich loam to poor laterite, saline and alkaline to moderately acidic soils are well suited for its cultivation. Well-drained soil helps better vegetative growth. Water logged condition can cause root-rot and result in stunted growth.

The plant can be grown under partially shaded conditions but with low oil contents. It flourishes well under fairly high rainfall and humid conditions. Long days and high temperatures have been found favourable for plant growth and oil production. Topical and sub-topical climate (at altitudes upto 900m.) is suited for its cultivation.

LAND AND PREPARATION

The land is brought to fine tilth and laid out into plots of convenient sizes for irrigation. It is preferable to add 15 tonnes of farmyard manure per hectare during the preparation of land and mixed well in the soil.

NURSERY RAISING AND PLANTING

The nursery can be raised in the third week of February and transplanting is generally started in the middle of April. The plant is propagated by seeds. Raised seed bags of 15" x 4'9" size should be thoroughly prepared and well manured by addition of farmyard manure. About 200-300g seeds are enough to raise the seedlings for planting one hectare of land. The seed should be sown 2cm below in the nursery beds. The seeds germinate in 8-12 days and the seedlings are

ready for transplanting in about 6 weeks time 4-5 leaf stage. The seedlings are transplanted at 40 x 40cm and 40 x 50cm to get high herbage and oil yield per hectare

Weeding and Hoeing

First weeding is done one month after planting and the second 4weeks after the first. One hoeing after two months of planting is sufficient.

Manure/Fertilizer

Compost Vermi compost and organic manure is preferred. The optimum fertilizer dose recommended for this crop is 120 kg nitrogen and 60 kg. P_2O_5 per hectare

Irrigation

Irrigation depends upon the moisture content of soil. In summer 03 irrigations per month are necessary, in rainy season no irrigation is required. About 12-15 irrigations are enough during the year.

Harvesting/Post Harvesting Operation

The crop is harvested at full bloom stage. The first harvest is obtained at 90-95 days of planting. Then it may be harvested every 65-75 days interval. Harvesting is done usually on bright sunny days for good oil yield and its quality. It is not desirable to harvest the crop if there was a rain in the previous day.

Yield

About 5 tonnes of fresh herbage can be obtained twice or thrice a year per hectare

Economics

Expenditure per hectare	Rs.1, 000/-
Return per hectare	Rs.5, 000/- to 6,000/- (In 2½ months)
Net income (Year-2001)	Rs.4, 000/- to 5,000/-

Note: Market for medicinal plants is volatile and the economics may vary.

Institute to be Contacted:

- Utthan Centre for Sustainable Development & Poverty Alleviation, 18-A, Auckland Road, Allahabad-211001 (Uttar Pradesh)
- NBPGR, Pusa Campus, New Delhi
- Regional Research Laboratory Jammu

VAI VIDANG

Embelia ribes Burm.f. Family - Myrsinaceae

A large scandent shrub with elliptic lanceolate **leaves**; **flowers** small white or greenish-white; **fruits** are small rounded red to blackish, striated, 3-4 mm berries. Flowering March-April and fruiting June-October.

COMMON NAMES: Bhabhirang, Vidangah & Baobarang

DISTRIBUTION: Hills of eastern India in Assam, Bengal, Orissa, Bihar, Madhya Pradesh and through out north India.

PART USED: Fruit

CULTIVATION:

SOIL AND CLIMATE

The plant can be grown in a variety of soils including light black cotton soil, sandy/rocky in different agro-climatic conditions in tropical regions up to 800-1500 m. altitude.

NURSERY RAISING AND PLANTING

The seeds are sown in well-prepared nursery beds in May-June. About Five-kilogram seeds are required for preparing 10,000 plants, which are sufficient for one acre of land. The seedlings of six months are transplanted in to the heavily manured field at a distance of 60x60cm. The seedlings can also be planted in pits of 1x1 feet size.

MANURE / FERTILIZER

Compost/Vermi compost, organic manure is preferred.

WEEDING

Weeding and thinning of plants may be done as and when required usually after 15-30 days for better growth of the plants.

IRRIGATION

The plantation can be irrigated usually at an interval of 15 days.

HARVESTING/POST-HARVESTING

Harvesting is done after two years. Generally fruiting starts in August-September after 2 years of plantation and fruit ripes during November to January. The fruits are collected, dried in shade and stored in clean porous Jute-bags. The fruits are collected manually and the plant is allowed to grow further.

YIELD

The produce (dry fruits) of about 25-q/h hectare can be collected.

ECONOMICS

The rate for 01 kg of fruit ranges from Rs.40-50.
(YEAR-2001)

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTE TO BE CONTACTED:

- **CENTRAL RESEARCH STATION, DR. PUNJAB RAO DESHMUKH KRISHI VIDYAPEETH, AKOLA (MAHARASHTRA)**
- **CENTRE FOR ENTREPRENEURSHIP DEVELOPMENT MEDICINAL & AROMATIC PLANTS (CEDMAP), 60 JAIL ROAD, BHOPAL (MADHYA PRADESH).**

VATSNABH

Aconitum ferox **Wall.** **Family -Ranunculaceae**

A perennial herb with tuberous **roots** 50-100 cm high with an erect **stem**; **leaves** semi-circular; **flower** blue, in loose racemes. Roots are dark-brown externally and on tasting, it produces strong tingling sensation.

COMMON NAMES: Mithavis, Vatsanabhah & Bach

DISTRIBUTION: Hills of Himachal Pradesh, Uttaranchal, Jammu & Kashmir & Sikkim

PART USED: Root

CULTIVATION:

SOIL AND CLIMATE

Sandy textured loam soil, rich in moisture, humus and in organic carbon between 2000-3000 m. altitude near snow line usually on slopes is preferred. It requires temperate to sub-alpine area. The land for planting may be sloppy with raised beds in between furrows like potato cultivation.

NURSERY RAISING AND PLANTING

Seeds are sown during February-March about 3-4 cm deep in the soil and 10-15 cm apart in the raised nursery beds. Five hundred to eight hundred grams seeds in one hectare are sufficient. The sprouting/germination of seeds should be protected from frost. About 5-10 cm long seedlings are suitable for transplantation in the field. The pieces of root tubers (root-stocks) with growing buds can also be planted directly in the field during May-June.

MANURE/FERTILIZER

Compost/vermi-compost or organic manure is preferred.

IRRIGATION

Irrigation may be done till flowering or fruit setting is there, usually intermittently as per requirement (weekly/fortnightly)

WEEDING

Weeding of plants may be done as and when required usually after 15-30 days for better growth of the plant.

HARVESTING/POST-HARVESTING

The mature root tubers after completion of reproductive (Flowering/Fruiting) phase are ready for collection with in three years of planting. However, it is observed that maximum active ingredients are found during July-August at the time of initiation of flowering period. Thus during this period plants can be harvested to achieve high quality of active contents. The collected tubers are cut into small pieces, dried in shade and stored in cool moisture free dry containers.

ECONOMICS

The rate for 01 kg of roots ranges from Rs.100-130.
(YEAR-2001)

Note: Market for medicinal plants is volatile and the economics may vary.

INSTITUTE TO BE CONTACTED:

- **NBPGR REGIONAL STATION, PHAGLI, SHIMLA-171 0004 (HIMACHAL PRADESH)**
- **HEMVATINANDAN BAHUGUNA UNIVERSITY, SRINAGAR (UTTARANCHAL)**

SHELF-LIFE OF SELECTED MEDICINAL PLANTS (PART-WISE)

S. NO.	COMMON NAME	BOTANICAL NAME	PART	SHELF LIFE (AS PER GSP*) (IN YEARS)
1.	Amla	*Emblica officinalis* Gaertn	Fruit	1
2.	Ashok	*Saraca asoca* (Roxb.) de Wilde	Bark	2
3.	Ashwagandha	*Withania somnifera* (Linn.) Dunal	Root	1½
4.	Atees	*Aconitum heterophyllum* Wall.	Root	2
5.	Bael	*Aegle marmelos* (Linn) Corr.	Bark, Fruit, Leaf	2 1½ 9 months
6.	Bhumi amlaki	*Phyllanthus amarus* Schum & Thonn. (*P. niruri* Linn.)	Whole plant	1
7.	Brahmi	*Bacopa monnieri* (Linn.) Pennell	Whole plant	1
8.	Chandan	*Santalum album* Linn.	Heart wood	5
9.	Chirata	*Swertia chirata* Buch-Ham.	Whole plant	1
10.	Giloe	*Tinospora cordifolia* Miers.	Stem	6 month
11.	Gudmar	*Gymnema sylvestre* R. Br.	Leaves	1½
12.	Guggal	*Commiphora wightii* (Arn.) Bhandari	Gum resin	5
13.	Isabgol	*Plantago ovata* Forsk.	Seed husk	2
14.	Jatamansi	*Nardostachys jatamansi* DC.	Rhizome	2
15.	Kalihari	*Gloriosa superba* Linn.	Root	2
16.	Kalmegh	*Andrographis paniculata* Nees	Whole plant	1
17.	Kokum	*Garcinia indica* Chois.	Fruit	1
18.	Kuth	*Saussurea costus* C. B. Clarke (*S.lappa*)	Root	2
19.	Kutki	*Picrorhiza kurroa* Royle ex Benth.	Rhizome	2
20.	Makoy	*Solanum nigrum* Linn.	Whole plant, Fruit	1
21.	Mulethi	*Glycyrrhiza glabra* Linn.	Root	2
22.	Musali Safaid	*Chlorophytum arundinaceum* Baker. (*C. borivillianum*)	Root	2
23.	Pashan Bheda (Coleus)	*Coleus barbatus* Benth.	Root	2
24.	Pippal	*Piper longum* Linn.	Fruit	2
25.	Rasaut (Daruhaldi)	*Berberis aristata* DC.	Root, Bark, Stem	1 2½ 2
26.	Sarpgandha	*Rauvolfia serpentina* Benth. ex Kurz	Root	2
27.	Senna	*Cassia angustifolia* Vahl.	Leaves	1½
28.	Shatavari	*Asparagus racemosus* Willd.	Root	1½
29.	Tulsi	*Ocimum sanctum* Linn.	Leaves Seed	1 2
30.	Vai Vidang	*Embelia ribes* Burm. f.	Fruit	2
31.	Vatsnabh	*Aconitum ferox* Wall.	Root	2

* GSP- GOOD STORAGE PRACTICES

List of some Institutions/Organisations engaged in Research/ Cultivation of Medicinal Plants:

S.No.	Name of Institution	Agro-techniques available
1.	Department of Agricultural Botany and Crop Physiology, Jawaharlal Nehru Krishi Vishwa Vidyalaya, JABALPUR-482 004 (MP)	
2.	Regional Research Laboratory, BHUBANESWARA-751 013 (Orissa)	
3.	Centre for Advanced Study in Botany, University of Madras, CHENNAI-600 025	*Gymnema sylvestre*(madhunashni), *Andrographis peniculata* (Kalmegh)
4.	Kerala Agricultural University, Aromatic & Medicinal Plants Research Station, Asamannoor P.O. Odakkali, KERALA-683 549	*Saraca asoca*(Ashok)
5.	National Botanical Research Institute, Rana Pratap Marg, LUCKNOW-226 001	
6.	Division of Floriculture, Medicinal & Aromatic Plants, S. K. University of Agricultural Science and Technology, Shalimar, SRINAGAR-191 121	*Inula racemosa*(Pushkarmool), *Swertia chirata* (Chirayata)
7.	Nagarjun Medicinal Plants Garden, Dr. Punjabrao Deshmuk Krishi Vidyapeeth, P.O. Krishinagar, AKOLA- 4 (Maharastra)	*Embelia ribes*(Vidanga)
8.	Tropical Botanical Garden and Research Institute (TBGRI), Karimancode, P.O. Palode, Thiruvanthapuram-695562 (KERALA)	
9.	Deptt. Horticulture & Project, Narender Dev University of Agriculture & Technology, Narander Nagar, P. O. Kumarganj, FAIZABAD-224 229	
10.	Central Institute of Medicinal and Aromatic Plants (CIMAP) P.O. CIMAP, LUCKNOW-226015	
11.	Division of Plant Science & Ecology Regional Research Laboratory, JORHAT-785 006 (Assam)	*Chlorophytum arundinaceum* (Musali Safaid)
12.	Head, Department of Agro-forest and Environment, H.P. Krishi Viswa Vidyalaya, PALAMPUR-176 062 (H.P.)	
13.	Department of Natural Products, Education & Research, Sector-67, S.A.S. Nagar, MOHALI-160 062 (Punjab)	*Bacopa monnieri* (Brahmi), *Asparagus adscendens*
14.	Jamia Hamadard, Hamdard Nagar, NEW DELHI - 110 062	*Tinospora cordifolia*(Guduchi)
15.	High Altitude Plant Physiology Research Centre, H. N. B. Garhwal University, Post Box - 14, Srinagar, GARHWAL-246 174	*Picrorrhiza kurroa* (Kutki), *Aconitum heterophyllum*(Atees), *Nardostachys jatamansi* (Jatamansi)
16.	Herbal Garden, Herbarium & Research Institute in ISM, Manali-Pathankot Highway, Government of H.P., JOGNDER NAGAR District Mandi-176 061 (HP)	*Bacopa monnieri*(Brahmi)
17.	NWFP, Division Tropical Forest Research Institute, P.O. RFRC, Mandla Road, JABALPUR-482 021 (MP)	
18.	Deptt. of Botany, J.N. Vyas University, JODHPUR-342 001	*Commiphora wightii* (Guggal)
19.	Director, State Forest Research Institute, Polopather, JABALPUR-482 008 (MP)	
20.	Horticulture (M&AP),University of Agricultural Sciences,G.K.V.K., Campus, BANGALORE-560 065	
21.	Head, NWFP, Forest Research Institute (ICFRE), P.O. New Forest, DEHRADUN-248006 (Uttarnchal)	
22.	Instt. of Himalayan Bioresource Technology,Palampur Post Box No.6, HIMANCHAL PRADESH-176 062	

23.	NBPGR, Pusa Campus, New Delhi-110 012	*Asparagus racemosus* (Satavari)
24.	NBPGR, Regional Station, Distt. Nanital BHOWALI-263 132 (UP)	
25.	NBPGR Regional Station, Phagli, SHIMLA-171 0004	*Aconitum palmatum* (Partivisha), *Aconitum ferox* (Vatsnab)
26.	Regional Research Laboratory (Jorhat) Branch, Ita Nagar, P.O. Naharlagun NAHARLAGUN-791 110 (Arunachal Pradesh)	
27.	Director, Indian Inst. of Horticultural Research, BANGALORE- 560 089	
28.	Department of Agronomy, College of Agriculture, G.B. Pant University of Agriculture & Technology, PANT NAGAR-263145 (UP)	
29.	Director, Regional Research Laboratory (CSIR), Canal Road, JAMMU-TAWI - 180 001 (J&K)	
30.	Mahatma Phule Krishi Vidyapeeth, Rahuri, Distt, Ahmednagar, MAHARASHTRA	
31.	NBPGR, Regional Station New Kench's Trace. Shillong, SHILLONG-793 013, (Meghalya)	
32.	Deptt. of Horticulture, S. K. N. College of Agriculture, Rajasthan Agriculture University, JOBNER-303 329 (Rajasthan)	
33.	Pt. Jawaharlal Nehru College of Agriculture & Research Institute KARAIKAL-609 603 (Pondicherry)	
34.	J.L. Nehru Ayurvedic Medicinal Plants Garden, Kothrud, PUNE. (Maharashtra)	*Asparagus racemosus* (Shatavari)
35.	Utthan, Centre for Sustainable Development & Poverty Alleviation, 18-A Auckland Road, Civil Line ALLAHABAD	*Phyllanthus amarus* (Bhumi amlaki), Asparagus racemosus (Shatavari), Bacopa monnieri (Brahmi), *Withania somnifera* (Ashwagandha)

36.	Survey of Medicinal Plants Unit Regional Research Institute of Unani Medicine, Post Box 70, Aligarh-202001	
37.	Guggal herbal form Mangliawas CCRAS, Ajmer (Rajasthan)	
38.	Department of Botany, J. N. Vyas University, Jodhpur-342001 Rajasthan	
39.	Department of Plants Breeding, Chaudhary Charan Singh Agriculture University Haryana, Hissar –125004	
40.	CEDMAP, 60, Jail Road, Jahangirabad, Bhopal (Madhya Pradesh)	

LIST OF SOME IMPORTANT PUBLICATIONS

S. No.

1. ***A report of medicinal plants of Kachchh*** (Gujarat)- CCRAS, 61-65, Institutional Area, Janakpuri, New Delhi-58, 1998

2. ***Contribution of medico-botany of east Godavari and west Godavari district of Andhra Pradesh***- CCRAS, 61-65, Institutional Area, Janakpuri, New Delhi-58, 1989

3. ***Glimps of medico-botany of Bastar district (Madhya Pradesh)***- CCRAS, 61-65, Institutional Area, Janakpuri, New Delhi-58, 1990

4. ***Medico-Botanical exploration of Puri district (Orissa)***- CCRAS, 61-65, Institutional Area, Janakpuri, New Delhi-58, 1989

5. ***Medico-Ethno-Botany of Sonebhadra district***- CCRAS, 61-65, Institutional Area, Janakpuri, New Delhi-58, 1993

6. ***Medico-Ethno- Botanical exploration of Sikkim Himalayas***- CCRAS, 61-65, Institutional Area, Janakpuri, New Delhi-58, 1991

7. ***Medical Plants of Nagpur and Wardha forest division (Maharashtra)***- CCRAS, 61-65, Institutional Area, Janakpuri, New Delhi-58, 1999

8. ***Observation of Medico-Botany of Andaman-Nicobar Islands***- CCRAS, 61-65, Institutional Area, Janakpuri, New Delhi-58, 1980

9. ***Preliminary techno Economical Survey of natural resources and herbal wealth of Laddakh***- CCRAS, 61-65, Institutional Area, Janakpuri, New Delhi-58, 1978

10. ***Tribal pocket of Niligiris recording of the field study on medicinal flora and health practices***- CCRAS, 61-65, Institutional Area, Janakpuri, New Delhi-58, 1976

11. ***Uttarakhand vanoushadhi Darshika***- CCRAS, 61-65, Institutional Area, Janakpuri, New Delhi-58, 1977

12. ***Cultivation of Guggulu***- CCRAS, 61-65, Institutional Area, Janakpuri, New Delhi-58, 1999

13. ***Experimental Cultivation of Saffron (Kumkum)***- CCRAS, 61-65, Institutional Area, Janakpuri, New Delhi-58, 1995

14. ***Pharmacognosy of Indigenous drugs***- CCRAS, 61-65, Institutional Area, Janakpuri, New Delhi-58, 1999

15. ***Phytochemical investigation of certain medical plants used in Ayurveda***- CCRAS, 61-65, Institutional Area, Janakpuri, New Delhi-58, 1990

16. ***Database on medicinal plants used in Ayurveda Volume-I, II & III***- CCRAS, 61-65, Institutional Area, Janakpuri, New Delhi-58, 2000

17. ***Album ISM medicinal plants***-PLIM, III-A C. G. O. complex-1, Kamla Nehru Nagar Ghaziabad, 1997

18. ***Album of crude drugs***- PLIM, III-A C. G. O. complex-1, Kamla Nehru Nagar Ghaziabad, 1999

19. ***Plants drugs of Ayurvedic pharmacopoeia of India Volume-I*** – PLIM, III-A C. G. O. complex-1, Kamla Nehru Nagar Ghaziabad, 2001

20. ***Acontribution of medicinal plants of Aligarh*** (Uttar Pradesh)-I CCRUM, 61-65, Institutional Area, Janakpuri, New Delhi-58

21. ***Medicinal plants of Gwalior forests division***- CCRUM, 61-65, Institutional Area, Janakpuri, New Delhi-58

22. ***Medicinal plants of Andhra Pradesh Part-I***- CCRUM, 61-65, Institutional Area, Janakpuri, New Delhi-58

23. ***Medicinal plants of North Arcot district, Tamil Nadu***- CCRUM, 61-65, Institutional Area, Janakpuri, New Delhi-58

24. ***Potential antimalarial herbal drugs from south eastern Indian***- CCRUM, 61-65, Institutional Area, Janakpuri, New Delhi-58

25. ***A guide to important medicinal plantz used in Homoeopathy Volume-I***- HPL, III-A C. G. O. complex-1, Kamla Nehru Nagar Ghaziabad, 1996

26. *A guide to important medicinal plants used in Homoeopathy Volume-II*- HPL, III-A C. G. O. complex-1, Kamla Nehru Nagar Ghaziabad, 1997

27. *A photographic album on medicinal plants used in Homoeopathy, Volume-I*- HPL, III-A C. G. O. complex-1, Kamla Nehru Nagar Ghaziabad, 1998

28. *A photographic album on medicinal plants used in Homoeopathy, Volume-II*- HPL, III-A C. G. O. complex-1, Kamla Nehru Nagar Ghaziabad, 1999

29. *A compendium of active principles/phytochemicals of medicinal plants used in Homoeopathy. Volume-I*- HPL, III-A C. G. O. complex-1, Kamla Nehru Nagar Ghaziabad, 2001

30. *A check list of Homoeopathic medicinal plants of India* –CCRH, 61-65, Institutional Area, Janakpuri, New Delhi-58, 1996

31. *Common Indian plants used in Homoeopathy*- CCRH, 61-65, Institutional Area, Janakpuri, New Delhi-58, 1998

32. *A series of 25 medicinal plants by D. N. Tiwari, et.al.* - Utthan Centre for Sustainable Development & Poverty Alleviation18-A, Auckland Road, Allahabad-2001

- **SOME IMPORTANT WEB-SITES FOR GETTING INFORMATION REGARDING MEDICINAL PLANTS:-**

1. http://www.ccras.org
2. http://www.unanimedicine.org
3. http://www.unanimedicine.com
4. http://mohfw.nic.in/ismh
5. http://indianmedicine.nic.in

LIST OF TRADERS AND EXPORTERS

ANDAMAN & NICOBAR

1 **Andaman & Nicobar Forest Development corporation Ltd.**
P.O. Haddo, Port Blair-744103

ANDHRA PRADESH

2 **A.V.V. Satyanarayana**
A.P. Residential School, District Visakapatanam Pedabayalu-531040

3 **Deccan Phytochemicals**
309, Kabra complex, 61, M.G. Road, Sikandrabad-500003
Trade in *Gloriosa superba, Emblica officinalis, Withania somnifera, Tribulus terrestris, Cassia anugustifoilia, Aegle marmelos*

4 **Girijan Do-op. Corporation Ltd.**
East Point Colony,
Visakhapatanam-530017

5 **Jailaxmi Exports**
2-34-14, Gandhi Nagar,
Gundibandi Street Tenali,
Guntur-522201

6 **Krihivala Herbal and Plant Products**
Opp. NGO's House, SBI Road
Sattenapalli-522403, Distt. Guntur

7 **Quest Marketing Company**
Flat No.101, 6-3-1112/7,
Snowdrop Apartments, Street No.3, Green Landa, Begam Peth, Hyderabad-500016

8 **Prabhat Agri Biotech Pvt. Ltd.**
3/6/168/7, First Floor,
Haidurguda, Hyderabad-500029

9 **Suman Trading Company**
10-2/32/1 Pamuvair Street,
Ramaraopeta,
Kakinada-533004

10 **P. Rajinder Kumar K. Gangadhar Exporters and Importers,**
21-2-156, Gulzar Hauz,
Hyderabad-500002

11 **Pfimex International Ltd.**
4-1-1240 King Kothi Road,
Hyderabad-500001

ARUNACHAL PRADESH

12 **Arunachal Pradesh Forest Corporation Ltd.**
Post Box No.123, District
Papum Pare, Itanagar-791111

ASSAM

13 **Assam Phytochemical Industries**
R.K.Bose Road, Dhubri-793301

14 **Chranji Lal Raut**
12th Mile, Sadiya,
Distt.Dibrugarh
P.O. Kukramara

15 **Chothmall Joshi**
"Joshi Kunj" 2nd Mile,
Sevoke Road,
Silliguri-734401

16 **Das and Sons**
North Lakhimpur,
Assam

17 **Dasakarma Bhandar**
Barpeta Road, Assam

18 **Essential Oil Industries**
Distt. Sibnagar,
P.O. Sepon-785673

19 **Govind Prasad Raut**
8th Mile, P.O.Mandil Sadiya,
Distt. Dibrugarh

20 **Jain Essential Oil Plantations**
P.O. Milan Nagar, C.R.
Building, Dibrugarh

21 **Phyto-Biotech International**
GNB Road, Ambari,
Guwahati-781001

22 **Swarn Kumar Jain**
Nemchand Jain & Sons
Naya Bazar, Silliguri-734405

BIHAR

23 **M.S. Hoda**
Piska Farm, Piska Nagri,
Ranchi-835303

CHANDIGARH

24 **Durga Seeds**
24/8 Industrial Area, Phase-II,
Chandigarh-160002

25 **Herbal Drug Vendors**
Interstate Bus Terminus,
Sector-17,Chandigarh-160002

26 **Herbas Indica**
351 Industrial Area-II,
Chandigarh-160002

DELHI

27 **Agricultural and Processed Food Products Exports Development Authority (APEDA)**
3rd Floor, Ansal Chamber-II, 6
Bhikaji Cama Place,
New Delhi-110066 Email:
headq@apeda.delhi.nic.in
Export promotion of agriculture goods including medcinal and aromatic plants

28 **Amar Ji**
330 Katra Hussain Baksh, Khari
Baoli, Delhi-110006

29 **Anu Chem Industries**
N-11, Kailash Colony,
New Delhi-110048

30 **Aruna Brothers**
J-27 A. Jungpura Extension,
P.B.-352. New Delhi-110001

31 **Asian Drug Company**
1244 Chah Rahat.
Delhi-110006

32 **Babu Ram Harish Chand**
2114 Khari Baoli.
Delhi-110006

33 **Back Impexs International Pvt. Ltd.**
Back House. DDA Commercial
Complex, 13 Masjid Moth. New
Delhi-110048

34 **Banoushadi Jari-Buti Bhandar**
S-19, Budh Vihar,
Delhi-110041

35 **Banwari Lal Shree Ram**
545, Katra Ishwar Bhawan,
Khari Baoli,
Delhi-110006

36 **Beshaj Bhawan**
6668, Khari Baoli,
Delhi-110006

37 **Bharati Healthcare Limited**
Qutan Ambience, Near Qutub
Minar, H-5/12, Mehrauli Road,
New Delhi-110030

38 **Brij and Company**
567-A, Katra Ishwar Bhawan,
Khari Baoli, Delhi-110006

39 **Devi Prasad Ashish Kumar**
2772 Gali, Arya Samaj Bazar,
New Delhi-110001

40 **Devi Sahai Banwari Lal and Sons**
2089-90 Katra Tambacoo,
Khari Baoli, Delhi-110006

41 **Devi Sahai Mohan Lal**
2210-1 Aggarwal Market,
Katra Tambacoo,
Khari Baoli, Delhi-110006

42 **Drug and Alkaloide Company**
4127 Naya Bazar, P.B. 1279,
Delhi-110006

43 **Durga Prasad and Company**
2080-81, Katra Tambhakhu,
Khari Baoli, Delhi-110006

44 **Faqir Chand and Sons**
6704 Khari Baoli, Near
Fatehpuri, Delhi-110006

45 **G.K. Pharma**
2725, Chelam Street,
Daryaganj, New Delhi-110002

46 **Gadodia Kirana Company**
2084 Katra Tombacoo,
Khari Baoli,
Delhi-110006

47 **Gaindamal Babulal and Company**
Block-B, Pocket, W Flat, 74
Shalimar Bagh,
Delhi-110052

48 **Gauri Shankar and Company**
532 Katra Ishwar Bhawan,
Khari Baoli, Delhi-110006

49 **Gopal Brothers**
578 Katra Ishwar Bhawan,
Khari Baoli, Delhi-110006

50 **Gutti Ram Sukhanand**
290/2 Katra Pedam, Khari
Baoli, Delhi-110006

51 **Hamdard Laboratory**
Head Office, Herbs and Crude
Drugs, Post Box-1507,
Hamdard Marg, Delhi-6

52 **Hari Ram & Company**
412 Katra Medgran, Khari Baoli, Delhi-110006

53 **Hari Ram and Company**
2045 Aggarwal Market, Katra Tambacoo, Khari Baoli, Delhi-110006

54 **Herbs Exporter**
D-49 Defence Colony, Delhi—110024

55 **Herbs India Incorporation**
15A/16 Damodar Park, Dilshad Park, Shahadra, Delhi-110095

56 **Himalayan Drug Company**
20, Najafgarh, New Delhi-110015 Mainly *Asparagus rasemosus, Nardostachys jatamansi, Piperlongum, Picrorhiza kurroa*

57 **Himalayan Drugs, Herbs and Alkaloids Syndicate**
C-4/33-A, Lawrence Road, Delhi-110035

58 **Indian Drug and Alkaloids Company**
282/2-A, Marg 2, Than Singh Nagar, Anand Parbat, Delhi-110005

59 **Indian Drug House**
6669 Khari Baoli, Delhi-110006

60 **Indian Institute Foreign Trade**
B-21, Mehrauli Institutional Area, New Delhi-110016

61 **Indo Drugs Hybrid Seeds**
218/5 Gali No.10, Than Singh Nagar, Anand Parbat, New Delhi-110005

62 **Indo World Trading Corporation**
303 Prakash Chambers, 6 Netaji Subhash Marg, Daryaganj, New Delhi-110002

63 **Indian Drugs and Botanical Herbs Company**
103, Ram Nagar, Krishna Nagar, Post Box-9416, Delhi-110051

64 **Innovations Pharma International**
62/12 Old Rajinder Nagar, New Delhi-110050

65 **International Traders**
Gopinath Building, Gali Batashan
Khari Baoli, Delhi-110006

66 **Ishan Marketing Pvt. Ltd.**
901, Nirmal Tower, 22, Barakhamba Road, New Delhi-110001

67 **Jagdish Kumar Hair Om and Company**
485/2, Katra Ishwar Bhawan, Khari Baoli, Delhi-110006

68 **Jai Hind Trading Corporation**
28, New Rohtak Road, New Delhi-110005

69 **Jay Kay and Company**
8 Gopi Nath Building, Khari Baoli, Delhi-110006

70 **Kadmi International**
Kashi House, & 7-A, Cannaught Place, New Delhi-110001

71 **Kapur International**
A-288, Drawala Nagar, New Delhi-110009

72 **Karan Enterprises**
4066, Khari Baoli, Delhi-110006

73 **Kolaba Business Centre**
C-25/5 Middle Circle, Cannaught Place, New Delhi-110001

74 **Kuria Mal and Sons**
Kiran Mansion, 4834/24 Ansari Road, Darya Gunj, New Delhi-110002

75 **Lal Mata Deen Bhagwan Das**
548/49 Katra Ishwar Bhawan, Khari Baoli, Delhi-110006

76 **Lehri Mal Anoop Kumar and Company**
576 Katra Ishwar Bhawan, Khari Baoli, Delhi-110006

77 **Matadin Bhagwan Dass**
548 Katra Ishwar Bhawan, Khari Baoli, Delhi-110006

78 **Maxo Laboratories Pvt. Ltd.**
35-E, Kamla Nagar, P.O. Box-2156, Delhi-110007

79 **Mohammed Hussain Ajmal Hussain**
6681/82, Khari Baoli, Delhi-110006

80 **Mohammed Nasim/ Arshad Hussain**
Natinal Drug House
94-A, 1st Floor, Gandhi Gali, Tilak Bazar, Khari Baoli, Dehli-110006

81 **Mohd. Hassan/Maqbool Hassan**
6681-82, Khari Baoli, Delhi-110006

82 **Murari Lal Tek Chand**
Katra Ishwar Bhawan, Shop No.2, Om Maket, 40 Khari Baoli, Delhi-110006

83 **Mutual Traders**
449 Naya Bans, Khari Baoli, Delhi-110006

84 **Narco Exports**
A-340, New Sabzi Mandi, Azadpur, Delhi-110033

85 **Nathi Mal Rugan Mal**
6689, Khari Baoli, Delhi-110006

86 **Natural Bonanza**
23, Model Basti
New Delhi-110005 Mainly dealing with *Centella asiatica, Acorus calamus, Rubia cardifolia, Picrorhiza kurroa, Asparagus racemosus.*

87 **Navin Bharat Manufacturers**
D-373 Defence Colony,
New Delhi-110024

88 **New Kirayana Store**
2565 Tilak Bazar, Khari Baoli,
Delhi-110006

89 **Niharica International**
105, Prakash Chambers, 6,
Netaji Subhash Marg,
Daryaganj,
New Delhi-110002

90 **Om Prakash Madan Lal Pvt. Ltd.**
2190-95, Gali Kinga Beg,
Tilak Bazar, Delhi-110006

91 **Oriental Herbs**
E-26 Saket, New Delhi-110017

92 **Orissa Overseas**
606, 6th Floor, Ashoka Estate,
Barakhamba Road,
New Delhi-110001

93 **Pramod Goel / Vivek Goel Durga Prasad & Company,**
2080, Katra Tobacoo, Khari Baoli, Delhi-110006

94 **Prasad and Sons**
4771 Bharat Ram Road, 23
Daryaganj, Delhi-110002

95 **Punj Traders**
2087 Aggarwal Market, Katra Tambacoo, Khari Baoli,
Delhi-110006

96 **R.G. Herbal Private Ltd.**
M-53 Palika Bhawan, Opp. Hotel Hayat, R.K. Puram,
New Delhi-110066

97 **Radhey Shyam Rajinder Kumar and Company**
532 Katra Ishwar Bhawan,
Khari Baoli, Delhi-110006

98 **Radhey Sons**
367/3 Katra Hussain Baksh,
Khari Baoli, Delhi-110006

99 **Radhika Enterprizes**
536, Katra Ishwar Bhawan,
Khari Baoli, Delhi-110006

100 **Raj Kumar Gupta/ Vijay Kumar**
Om Trading Company
330, Katra Hussain Bux,
Khari Baoli, Delhi-110006

101 **Rameshwar Das Chottey Lal**
2091 Katra Tambacoo, Khari Baoli, Delhi-110006

102 **Rosma Overseas Pvt. Ltd.**
4-6 Vandhana, 11 Tolstoy Marg, New Delhi-110001

103 **S. Chandra Enterprises**
82/2 (33) Chandni Chowk,
Delhi-110006

104 **S. Sangyong Corporation**
206 Arunachal Building, 19
Barakhamba Road,
Delhi-110001

105 **S. Sattara and Company**
1399 Tilak Bazar, Khari Baoli,
Delhi-110006

106 **Sadala Herbal Remedies**
131, Thapar Chambers-II,
Kalindi Colony, Ring Road,
New Delhi-110014

107 **Satish Chander Amar**
Amar International,
330, Katra Hussain Bux,
Khari Baoli, Delhi-110006

108 **Shalaks Chemicals**
C-3, Puja House, Karampura Community Centre, Main Complex, New Delhi

109 **Shahnaz Herbals**
M-84/A, Greater Kailash-I
New Delhi-110048, General herbs espaicially aromatic plants

110 **Shankar and Company**
519 Katra Ishwar Bhawan,
Khari Baoli, Delhi-110006

111 **Shreeya Overseas**
1701, Nirmal Tower, 26
Barakhamba Road,
New Delhi-110006

112 **Shyam Sunder Gupta**
2032 Aggarwal Market, Katra Tambacoo, Khari Baoli,
Delhi-110006

113 **Simple Herbs Enterprises**
A-216 Somdutt Chambers,
Bhikaji Cama Place,
New Delhi-110066

114 **Suresh Kapoor**
Ishwar Bhawan, Khari Baoli,
Delhi-110006

115 **Swaroop and Company**
330 Katra Hussain Baksh,
Khari Baoli, Delhi-110006

116 **Taj Trading and Company**
6681 Khari baoli,
Delhi-110006

117 **Times Agencies**
9/48 Punjabi Bagh,
Delhi-110026

118 **Tirkha Ram Om Prakash**
585 Katra Ishwar Bhawan,
Khari Baoli, Delhi-110006

119 **Tribal Cooperative Marketing Development Federation of India Ltd.**
Savitri Sadan 2, Preet Vihar Community Centre, Vikas Marg, Delhi-110092

120 **Trimurti Enterprises**
3 Satya Niketan, 1st Floor,
Moti Bagh-II,
New Delhi-110021

121 **Urmila Traders**
502, Katra Ishwar Bhawan,
Delhi-110006

122 **Vijay Gupta / Shailesh Gupta Indian Herbs Traders**
R.No. 2, 6654/2, New Gododia Market, Khari Baoli,
Delhi-110006

123 **Vijay Kumar Urmila Traders**
502, Ishwar Bhawan, Khari Baoli, Delhi-110006

124 **World Trading Corporation**
Opposite Parda Bagh,
Daryaganj
New Delhi-110002

GUJARAT

125 **Abhuday Industries**
27, Market Yard, Sidhpur-384151, Gujarat, Mainly *Plantago ovata*

126 **Ashok Industries**
Bhandu Highway, Bhandu
Distt. Mehsana, Mainly *Plantago ovata*

127 **B.K. Industries**
G.I.D.C. Estate,
Palanpur-385002 Mainly *Plantago ovata*

128 **Balisana Isabgol**
G.I.D.C. Estate, Distt. Mehsana, Balisana-384110 Mainly *Plantago ovata*

129 **Ban Mark**
Kamdar Mansion, Dhedar Road, Rajkot-360001

130 **Dashrathlal Ramjibhai Patel**
Hari Cotton Mills Compound,
Sidhpur-384151

131 **Deepan Trading Corporation**
A-47 Maskati Market, 1st Floor, Ahmedabad-380002

132 **Girdharilal Vithaldas Patel**
S.T. Road, Sidhpur-384151
Mainly *Plantago ovata*

133 **Golden Sat Isabgol Factory**
Highway, Kakosi, Chaurasta,
Sidhpur-384151 Mainly
Plantago ovata

134 **Gujarat State Forest Development Corporation Ltd.**
Vanganga 78, Alkapuri,
Vadodara-390007

135 **Hindustan Trading Corporation**
Sidhpur-384151 Mainly
Plantago ovata

136 **Indo Exports**
Bindu Sarover Road,
Sidhpur-384151 Mainly
Plantago ovata

137 **Jai Industries**
Highway, Khali,
Sidhpur-384151 Mainly
Plantago ovata

138 **K.V. Patel and Company**
S.T. Road, Sidhpur-384151
Mainly *Plantago ovata*

139 **Kantilal Joitaram Patel**
Kakosi Road, Sidhpur-384151
Mainly *Plantago ovata*

140 **Keshavlal Vithaldas Patel**
Gulab Prk, S.T. Road,
Sidhpur-384151 Mainly
Plantago ovata

141 **Presus Exports Corporation**
Zoriwala Building
Chandi Bazar,
Jam Nagar-361001

142 **Rajendra Brothers**
Highway, Khali,
Sidhpur-384151 Mainly
Plantago ovata

143 **Sanjay Traders**
Highway, Khali,
Sidhpur-384151 Mainly
Plantago ovata

144 **Satpal Kamal and Sons**
Bindu Sarover Road,
Sidhpur-384151 Mainly
Plantago ovata

145 **Shree Suvas Industries**
Highway, Chaurasta,
Palanpur-385002

146 **Shree Swastik Industries**
Deesa Highway, Chaurasta,
Palanpur-385002 Mainly
Plantago ovata

147 **Shree Swati Export Corporation**
Highway, Chaurasta,
Palanpur-385002 Mainly
Plantago ovata

148 **Sidhpur Isabgol Processing Company**
Bindu Sarover Road,
Sidhpur-384151 Mainly
Plantago ovata

149 **Sidhpur Sat-Isabgol Factory**
Bindu Saorver Road,
Sidhpur-384151 Mainly
Plantago ovata

150 **Vadilal Vithaldas Patel**
S.T. Road, Sidhpur-384151
Mainly *Plantago ovata*

151 **Yan Exporters Pvt. Ltd.**
210, Sampann Complex
Navrangpura,
Ahmedabad-380009

HARYANA

152 **Fakirchand Jagdish Chand Mistry**
Village Kahari-Kalam,
Distt: Ambala, Bhambhol,
Haryana

153 **Yamuna Pharmacy**
Yamuna Pharmacy Lane,
Jagadhri Road,
Yamuna Nagar-135001

HIMACHAL PRADESH

154 **Tibetan Medical and Astro Institute (Mentsee-Khang)**
Khara Danda Road, Distt. Kangra Dharamsala-176215
E-mail: tmai@ndf.vsnl.net.in
Species used in Tibetan medicine

155 **Dogra Drugs Pharma**
29 Industrial Estate, Bilaspur-174001

156 **Superb Fascinations Importers Exporters Indentors**
Sanjauli, Shimla-171004

JAMMU & KASHMIR

157 **Jammu & Kashmir Forest Development Corporation Ltd.**
C/o Chief Conservator of Forests Jammu-180001

158 **P.S. Jammal and Sons**
Street 16, 430 Patel Nagar, Talab Tillo, Jammu-180005

159 **Sheikh Nazir Ahmed**
15, New Idaha Building, Park Road, Baramulla, Kashmir

KARNATAKA

160 **Amrut Kesari Depot**
364, Avenue Road, Banglaore-560002

161 **Classic Medi Herbs**
323, 3rd main, JP Nagar, 3rd Phase Bangalore-560078
Trade in *Withania somnifera, Acorus calamus, Eclipta alba, Bacopa monnieri, Sweria chirata, Gymnema sylvestre, Tribulus terrestris, Gloriosa superba, Asparagus racemosus, Cassia angustofolia, Semecarpus anacardium*

162 **D & M Naturals and Frangrances**
No.12, 11th "A" Main Road, 11 Stage, west of Chord Road Bangalore-560086

163 **Fidelity Flavours**
344/18, 1B, Main Road, Jaya Nagar, 7th Block, West Bangalore-560082

164 **Hill Green Company**
17, 13th Cross, Vasant Nagar (East Extension), Bangalore-560052

165 **Karnataka Forest Development Corporation Ltd.**
Vanavikas, 18th Cross, Malleswaram Bangalore-560003 Trade in *Acorus calamus, Commiphora mukul, Eclipta alba, Costus speciosus, Gloriosa superba, Clerodendrum etc.* and other medicinal plants

166 **Karnataka Soaps and Detergent Ltd.**
Bangalore-Pune Highway
P.O. Box-5931, Rajaji Nagar, Bangalore-560055

167 **Mysore Sales International Ltd.**
MSIL House, 36 Cunningham Road, Bangalore-560052

168 **Natural Remedies Pvt. Ltd.**
Post Box-456
164/3 Basawi Mandir Road, Bangalore-560004, Deals in *Withania somifera, Saraca indica, Emblica offisinalis, Eclipta alba, Andrographics paniculata, Cyoerus rotundus, Asparagus recemosus, Tribulus terrestris, Pongamia glabra, Solanum migrum etc.*

169 **S.S. Trading Company**
15 Nehru Market, P.O. Box-21, Bijapur-586010

170 **Shroff Channabasappa and Sons**
174-175 Avenue Road, Bangalore-560002

KERALA

171 **A.S.R. Company**
Punalur-691305,
Kerala General herbs including *Lawsonis inermis*

172 **Arya Vaidya Sala**
Kottakkal,
Distt. Mallapuram-676503

173 **Diamond Exporters**
Krishnapadamam Buildings
Anayara P.O.,
Tiruvananthapuram-695012
E-mail:
dimondk@md3.vsnl.net.in
Exporter of medicinal and aromatic herbs

174 **K.P. Esthapanose and Sons**
Exporters and Importers
Post Bos-9, Alwaye-683101

175 **Kerala Agricultural University**
Aromatic and Medicinal Plants Research Station
P.O. Asamansor, Distt. Ernakulam, Odakkali-683549

176 **Money Corporation**
T.C. 27/979 Srikandeswaram East Road,
Thiruvananthapuram-695023

177 **Shell India**
P.B. 1, Sheratallay, P.O. Thayakal, Ernakulam-688530

178 **Worrier Herbal Products Ltd.**
P.O. Box- 826, Visitors Building Complex, M.G. Road, Thrissur-680004

MADHYA PRADESH

179 **Ajay Kumar Gandhi**
Smita Towers, Shop No.1, Padambabh Nagar,
Bhopal-462008

180 **Akhand Aushadhi Bhandar**
13, Shitalamata Bazar,
Indore-452003

181 **Akhand Ayurvedic Rasayan Sala**
276, Sector E, Sanwer Road,
Indore-452003

182 **Amar Chemicals**
Annu Talkies, Raipur Road,
Chamtari-492145 Trade in
Swertia chirata, Azardirachta indica, Zizyphus sp., *Emblica officinalis, Terminalia bellerica*

183 **Amsar (P) Ltd.**
47, Laxmibai Nagar, Industrial Estate,Indore-452006

184 **Anant Industries / Anant Drug House**
Anant House, Shawa Road,
Dhamtari-492145

185 **Arjun Das Narayan Das**
Gole Bazar, Katni-482005

186 **Ashok Pathak**
114, South Toda, Juni,
Indore-452001 Deals in
Centrella asiatica, Cyperus routundus, Butea monosperma

187 **Ashok Trading Company**
Old Industrial Area,
Dhamtari-492145, Trade in
Swertia chirata, Terminalia chebula, T. bellerica, Aegle marmelos, Azardirachta indica.

188 **Bhagwati Trading Company**
Satkar Hotel Gali,
Station Road, Raipur

189 **Bharat Drugs and Extracts**
13 Jail Road,
Dewas City-455001

190 **Bhawani Traders**
Raipur Road, Dhamtari-492145, Trade in *Swartia chirata,Azardirachta indica, Embalica officinalis, Terminalia chebula, t. bellerica.*

191 **Bhilwaray Herbal Extracts Company**
H-3, Lane-6, Ebrahimganj,
Bhopal-462011 Trade in
Swartia chirata,Azardirachta indica, Embalica officinalis, Terminalia chebula, T. bellerica.

192 **Bhogilal C. Shah and Company**
8 / 1 South Tukoganj,
Nabhodip,
Indore-452001 Mainly
Andrographis paniculata and gerneral herbs

193 **Bioveda Herbs Pvt. Ltd.**
A-436, B.D.A. Colony,
Shahpura,
Bhopal-462011

194 **Chindiya Diyawar (Shahu)**
Amla, Near Ram Mandir,
Distt-Baitul

195 **Chhotelal Rajendra Prasad Tiwari**
Ghantagahar, Katni-482005

196 **Das Trading Company**
Old Bus Stand,
Dhamtari-492145

197 **Dhani Ram Ratan Chand**
Ghantaghar, Katni-482005

198 **Doshi Enterprises**
Ratanbandha, Dhamtari-492145, *Swertia chirata, Azardirachta indica,Terminalia chebula, Tamarindus indica, Zizyphus* sp., *Emblica officinalis, Terminalia bellerica*

199 **Enbee Plantations**
236, Zone-II, MP Nagar,
Bhopal-462011 E-mail:
enbee@bom6.vsnl.net.in

200 **Gandharv Ayurved Research Institute**
4th Mile, Mandla Road,
Jabalpur-482020

201 **Gandharv Poly Pvt. Ltd.**
604, Matra Chhaya Bhawan,
Madan Mahal,
Jabalpur-482001 E-mail:
gandharv@bom6.vsnl.net.in

202 **Gangaram Mohanlal**
54, South Raj Mohalla,
Indore-452001

203 **Gwalior Forest Products Ltd.**
P.O. Katha Mill,
Shivpuri-473551

204 **Gopal Choorna Bhandar**
210, Maodia Bazar,
Indore-452001

205 **Guni Gopachal Ayurved Niketan**
Chowk Bazar, Gwalior

206 **Jagannath Kashi Prasad Aggarwal**
Hanumanganj, Katni-482005

207 **Jaggi Enterprises**
8, Lajpath Kunj, Napier Town,
Jabalpur-482001

208 **Jain Herbs Enterprises**
Rajeshwari Road,
Shivpuri-473551
Trade in *Asparagus racemosus, Gymnema sylvestre, Eclipta alba, Convolvulus pluricaulis, Tinospora cordifolia etc.* and othermedicinal herbs

209 **J.J. Herbals Products**
915, Lordganj, Jabalpur-482002

210 **Kamal Chand**
Bade Pasari, Near City Kotwali,
Jabalpur-482001

211 **Keshrimal Kastoorchand**
Naya Para, Raipur

212 **Kirana Trading Company**
Raipur Road, Sihawa Chowk,
Dhamtari-492145

213 **M/s Bahubali Udhyog**
21-A, Tifara Industrial Area
Bilaspur-495223, General
herbs especially *Swertia chirata*

214 **M/s Kayakalp Herbal Industries**
Thuwakheda, Kollar Road,
Ginnauri, Bhopal-462042

215 **M/s Shah Phulchand Deepak Kumar Jain**
Jumairati Bazar,
Bhopal-462001

216 **M/s Sardar Mal Bachmal Nahar**
Jumaitri Bazar, Bhopal-462001

217 **M/s Phulchand Mulchand**
Jumaitri Bazar,
Bhopal-462001

218 **M/s Kishalaya Herbals Ltd.**
303, Alankar Chambers,
2-A, Ratlam Kothi,
A-B Road, Indore-452001

219 **M/s Radhey Shayam Arvind Kumar Aggarwal**
2179, Right Town,
Jabalpur-482001

220 **M/s Shah Khazi Punsi and Sons**
Baitul ganj, Baitul, Trade in *Clerodendrum serratum, Mucuna pruprita, Greanium wallichianum, Terminalia chebula, T. bellerica, Embalica officinalis etc.*

221 **M/s Babulal Bhagat**
Village Kanawadi,
Tehsil-Ghodadongri
Disst. Baitul

222 **Madhya Pradesh State Minor Forest Produce Cooperative Federation Ltd.**
38-B, Vikas Bhawan, 4th Floor,
Bhopal-462011

223 **Mahaveer Gothi**
C/o Dhan shree Jewelers,
Kothi Bazar, Baitul, Mainly *Chlorophytum tuberosum* and other general herbs.

224 **Mahaveer Jari Booti Ayurved Bhawan**
Rajeshwari Road,
Shivpuri-473551

225 **Mahesh Kumar Arun Kumar**
Post Box No.64,
Hanumanganj, Katni-482005

226 **Malwa Herbal Collection and Industries**
Village-Kamorda, Hosangabad Road, Berkheda, Tehsil-Goharganj, Distt:Raisen-464551, Trade in *Terminalia chebula, T. Bellerica,*

Clerodendurm serratum, Rauvolfia serpentina, Chlorophythem tuberosum, Withania somnifera, azardirachta indica, Buchanamia lanzan

227 **Manshuji Traders**
485 / 1, Jawahar Marg,
Indore-452001

228 **Meghdoot Gramodhyog Seva Sansthan**
E-7/132 Arera Colony,
Bhopal-462016

229 **Mishree Lal Ueakay**
Sankar Ward, Behind Excise Office Ganj, Baitul, Trade in *Chlorophytum tuberosum, Curculigo orchiodies, Zinziber* sp., *Costus spesious, Asparagus racemosus, Withania somnifera, Pueraria tuberosa*

230 **Mohbe Herbal Products (P) Ltd.**
E-2 / 333, Arera Colony
Bhopal-462016

231 **Mohammad Ali Gulam Ali**
45, Siyaganj, Indore-462001

232 **Mukhtyar Hussain Gulam Abbas**
46, Jumairat Bazar,
Bhopal-462001

233 **Narmada Herbals and Medicinal Plants**
Kairobbs Building, Civil Lines,
Near Railway Station,
Jabalpur-482001, Trade in *Acorus calamus, Withania somnifera, Abelmoschus maoschatus*

234 **Nirmesh**
42, Jawara Compound
Mittal Chambers, Second Floor, Indore-452001

235 **P. Shanti Lal and Company**
Raipur Road, Dhamtari-492145

236 **Penol Herbal and Company**
219, Dwarka Nagar, N.B. Road,
Badera-460001, Distt-Betul

237 **Phulchand Attar**
Near Surya Narayan Mandir,
Dollatganj Lakshar, Gwalior

238 **Plaster India**
117, 118, S-1 / 8
Scheme No.-78,
Indore-452001

239 **R.S. Rathi**
Station Road, Dhamtari-492145

240 **Raj and Company**
Dashhara Maidan,
Neemach-458441, Trade in *Withanis somnifera, Chlorophytum tuberosum, Terminalia chebula, Asparagus racemosus, Lawsonia* sp. etc.

241 **Radhe Shyam Aggarwal**
Jaistambh Chowk,
Umaria-484661

242 **Rajasthan Choorna Bhandar**
11/1, Teli Bakhal, Malharganj,
Indore—452001

243 **Raj Kumar Jain**
Mahavir Jadi Booti
Auyurved Bhawan,
Rajeshwari Road,
Shivpuri-473551

244 **Rokaria Agencies**
Ampara, Dhamtari-492145

245 **Roli Health Centre**
63, Mayur Market, Thatipur,
Gwalior

246 **Sandeep Agarwal**
Akshat Udhyog, Bhanpur
Industrial Area, Raipur-493001

247 **Sanjay Kumar Shailendra Kumar Jain**
Sawarkar Colony,
Near Sankar Mandir,
Shivpuri-473551, Trade in *Embalica officinalis, Asparagus racemosus, Aloe vera, Cyperus rotendus, Solanum* sp., *Tribulus terrestris, Eclipta alba, Convolvulus pluricaulis, Plumbago zeylanica, Gymnema sylvestris, Salvai* sp.

248 **Santosh Kumar Jar**
Lalchand Shrichand Market
Hanumangani, Katni-482005

249 **Sarita Prasad**
C/o Ved Mahila Mandal
Near Gurudwara, Ranjhi,
Jabalpur-482001

250 **Satyam Herbs and Spices**
Sihawa, Raipur Road,
Dhamtari-492145, Trade in *Swertia chirata, Agele* sp., *Azardirachta indica, Zizyphus jujuba, Tamarindus indica, Emblica officinalis, Terminalia chebula, T. bellerica*

251 **Saraswati Trading Company**
Satkar Hotel Gali, Station
Road,
Raipur-493001

252 **Sheetal Prasad Jain**
Peeli Kothi, Kamala Ganj,
Shivpuri-473551

253 **Sheetal Traders**
Naya Para, Raipur-495223

254 **Shiv Trading Company**
Satkar Hotel Gali, Station
Road, Raipur-493001

255 **Shree Ram Agro Forestry Estate**
New Block, 5, First floor,
Farishta Complex, Raipur

256 **Shri Ram Trading Company**
Station Road, Neemach-458441, Trade in *Withania somnifera, Asparagus racemosus, Embalica officinalis, Plantago ovata, Carrica papaya*

257 **Shree Swastik Industries**
Manasnun, Raipur-493001

258 **Singhal Trading Company**
Satkar Hotel Gali, Station
Road, Raipur-493001

259 **Subhah Agro Products**
18 / 46, Penty Naka, Queens
Raod, Cantt. Jabalpur-482001
General herbs aspecilly *Acorus calamus*

260 **Taj Trading Company**
Ampara, Dhamtari-492145

261 **Vijay Lakshmi Industries**
Gol Bazar, Dhamtari-492145

MAHARASHTRA

262. **Ajanta Pharma Limited**
98, Charkop Industrial Estate,
Hindustan Naka Link Road,
Kanidivali (West) Mumbai – 400067

263. **Ajmal Fragrances and Flavours P. Ltd.**
1, Cecil Court, 24
Mahakavi Bhushan Marg,
Colaba Mumbai – 400030
Mainly aromatic herbs

264. **All India Drug supply Company**
11 Dariyasthan street, Masjid
Bunder Road,
Mumbai – 400003

265. **Amsar Pvt.Ltd.**
2 Hormuz Mansion, 72 – B,
Desai Road,
Fort, Mumbai – 400026

266. **Anil Ayurpharma**
Ladiwala Estate, Hingwala
Lane, Ghatkopar (E),
Mumbai – 400077

267. **Anil Goel**
JKH Exports, B/62, APMC
Complex, Phase II, Market I,
Sector – 19, Vashi,
New Mumbai – 400705
Exporter of Medicinal &
Aromatic Herb

268. **Aren Exports Pvt. Ltd.**
3/25 Steelyard House
67 – F, Sant Tukaram Marg
Mumbai – 400009, Exporter of herbs.

269. **Ashish Overseas Corporation**
34 Sarvodaya Industrial Estate,
Mahakali Road, Andheri East,
Mumbai – 400093.

270. **Asian Trading Corporation**
38/40 Veer Vithal Das,
Chandan Street
Mumbai – 400003

271. **Asoj Soft Caps Pvt. Ltd.**
Krishna Bai Building
Kashinath Dhuru Road, Agar
Bazar Dadar,
Mumbai – 400028.

272. **Ayurved Samshodhanlaya**
(ASUM) 1379, Shukrawar
Peth, Natu Beg, Pune – 411002

273. **Bajaj Health Care Pvt. Ltd.**
14/15, Faiz-E-Dros, 373, Narsi Natha Street ,
Mumbai – 400009

274. **Bardoli Agro Pvt. Ltd.**
Sri Ram Industrial Estate,
Near Company Kale Marg,
Kurla (West Mumbai)

275. **B.D.H. Industries Limited**
Nair Baug, Akurli Road,
Kandivli (East),
Mumbai – 400016

276. **Bharat Crude Drug Supply Company**
Ravji mansion, Kazi Syed Street, Mumbai – 400009

277. **Biddle Sawyer and Company (India) Pvt. Ltd.,**
25 Dalal Street, Fort,
Mumbai – 400001

278. **Bisco Company**
P.B. 5002, 12/14 Kazi Sayed Street, Mumbai – 400009

279. **C.M. Jain**
1, Carter Road, 9A – Dhavalgauga,
Bandra West, Mumbai

280. **D.Jamnadas and Company**
207 Samuel Street, Vadgadi,
Mumbai – 400003

281. **Dr. Jain's Special Herbs**
A-10 Raj Complex, 2nd Floor,
Military Road, Marol, Andheri East, Mumbai – 400059

282. **Excelar Trading Company**
29/31, Israil Mohalla,
Bhagwan Bhawan Mumbai – 400009.Mainly Rauwolfia seprpentina

283. **Export Enterprise**
34, Bhagwan Bhawan, 196/198 Samuel Street,
Mumbai – 400009

284. **Fairdeal Corporation Pvt. Ltd.**
66, Lakshmi Building, Sir P.M.Road, Fort,
Mumbai – 400001

285. **Foreign Trade Company of India**
12, Walkashwar Road,
Mumbai – 400009.

286. **Gautam Export Corporation**
506, Surat Sadan, 5th Floor,
Surat Street, Mumbai – 400009

287. **Hapro Homeo Chem. Pvt. Ltd.**
Unit No. 13, Opposite Staler Tower, Lokhanwala Complex, Char Bangla, Andheri (East), Mumbai – 400058, Herbs used in homeopathic medicines

288. **Healthcare Pharmaceuticals**
4, Vasant House, St. Andrew Road, Santacruz (West),
Mumbai – 400054.

289. **Hemant and Company**
509, Gordia House, 100-102 Kazi Syed Street, Mumbai -3

290. **Herbal Stores**
P.B.5047, 23 Khadak Street,
Mumbai – 400009

291. **International Traders**
Ramesh Chambers, 2nd Floor,
14 Gharibdat Street, Vadgadi,
Mumbai – 400003

292. **Jadavaji Lallubhai and Company**
247, Kalbadevi Road, P.O. Box 2034, Mumbai – 400002

293. **Jayesh Chaudhary Exotic Naturals**
401, Sundervan Complex,
A-4, Andheri (W), Mumbai – 400053 General and exotic herbs

294. **John Trading Corporation**
Post Box No. 5503,
Mumbai – 400014

295. **Juna Gandhi**
515-517, Maulana Azad Road,
Nuli Bazar, Mumbai – 400004

296. **K.Uttam Lal (Exports) Ltd.**
Bhagwan Bhawan, 1st Floor,
196-198 Samuel Street,
Mumbai – 400009

297. **Kamalkant Chotalal and Company**
106, Bhandari street,
Narianarao koli Marg,
Mumbai – 400003

298. **Kitij Patukala**
A-3/8 Chintamani Nagar,
Bhiwadi, Pune – 411037

299. **L. Nanalal Brothers**
New Anand Bhawan, Room No. 303, 3rd Floor, 257, Narshi Natha Street, Post Box No. 5022, Mumbai – 400009

300. **Laxmidas Haridas Tanna and Company**
Gulabi House, 3rd Floor,
111/115 Kazi Sayed Street,
Mumbai – 400009

301. **Lupin Laboratories Limited**
159, CST Road, Santacruz (East), Mumbai – 400098.
Mainly *Bacopa monnieri, Asparagas racemosus, Pueraria tuberosa, dioscorea* sp

302. **M/s A.Kaderali & Company**
189, Samuel Street, Khoja Gali, Mumbai- 400009

303. **M/s A.T.Verma**
35, Examiner Press Building,
Second Floor, Dalal Street,
Mumbai – 400023

304. **M/s Aditya Agro Industries**
14-B, Krishn Kunj, Second Floor, 140, Ballabh Bhag lane Ghatgopar (East),
Mumbai- 400077 , Mainly *Cassia angustifolia* leaves and pods.

305. **M/s Arora Enterprises**
401, Oriental House, 4th Floor,
229/231, Samuel Street,
Mumbai – 400003

306. **M/s Arun Kumar Parasrampuria**
13, Rajmahal, 1st Floor B-2, Bhuleshwar Road, Mumbai – 400002

307. **M/s Arvind Kumar Shanti lal**
2, Kumar Wara Lane, Opp. Ahmed Oil Mill, Pydhonie, Mumbai – 400003

308. **M/s Asrafi Exports**
Hoor Villa, 26/6 Maratha Mandir Marg, Mumbai – 400008

309. **M/s Arvind Kumar Jadavji**
Abeda Mansion, 143/145, Samuel St. Khoja Gali, Mumbai – 400009

310. **M/s Bhagat Impex Pvt. Ltd.**
1st Floor, 164 Sitaram Poddar Road, Panaswadi, Mumbai-400002

311. **M/s Comoditrad International**
109, Jolly Bhawan, No. 1, Plot No. 10, New Marine Lane, Mumbai – 400020

312. **M/s Demode and Company**
201, Narayana Peth, Laxmi Road, Pune – 411030

313. **M/s Farukh Impex**
C-3, Dalal Estate, Mumbai Central Mumbai – 400008

314. **M/s Ganga Exports**
12, Bhaweshwar Vihar, 383, -A, SVP Road, Mumbai – 400054

315. **M/s Global Link Exports**
Dada Manzil No. 1
4th Floor, 67/69 Muhammad Ali Road, Mumbai – 400003, Exporter of general herbs

316. **M/s Gopal Brothers**
180/82, Samuel Street, Mumbai – 400009

317. **M/s H.S. Bajaj and Sons**
391, Mahesh Chamber, 2nd Floor, Nursi Natha street, Mumbai – 400009

318. **M/s Haridas Aggarwal & Sons**
312, Central Facilty Building APMC Market – I, Phase –II, Vashi Navi Mumbai – 400703

319. **M/s Jairamdas Khusiram**
B/48, APMC, Market –I, Phase – II, Turbhe, Navi Mumbai –3

320. **M/s K. Uttam Lal**
Bhagwan Bhawan, P.O.Box 5174, 1961/198, Samuel Street, Mumbai – 400009

321. **M/s Panchsheel Trading Company**
G-28, APMC Market – I, Phase – II, Turbhe, Navi Mumbai – 400703

322. **M/s Puneet Trading Company**
10, 1st Floor, Humera Arcade, 2/4 Isrial Mohalla, Samuel Street, Mumbai – 400009

323. **M/s Vijay Agencies**
C-14, APMC, Market –I, Phase – II, Turbhe, Navi Mumbai – 400703

324. **Mangal Commercial Corporation**
215/88, Panjrenpole Road, Mumbai – 400004.

325. **Manilal and Lallu Bhai and Company**
P.B. 2008, 225 Kalbadevi Road, Near Narain Mandir, Mumbai – 400002.

326. **Medha Herbal Products**
197/1, Ceyon West, Mumbai – 400022

327. **Modern Agricultural Services**
Opposite Plot 60, Jai Hind Colony, Deopur, Dhule – 424002

328. **Mohan Kumar and Company**
158/187, Samuel Street, Mumbai – 400009

329. **Nathubhai Cooverji and Company**
Arna Bhawan, 87-C, Broach Street, Mumbai – 400009

330. **Navneeth Lal Savilal**
64, Mudi Bazar, Mandavi , Mumbai – 400003

331. **Niyogi and Company**
352-354, Samuel Street, Vadgadi Mumbai – 400003

332. **P.L.Associates**
Botwala Building, Top Floor, 8, Horniman Circle, Fort, Mumbai – 400001

333. **Pandit and Company**
D-49, Street 11, MIDC, Nasik – 422007

334. **Pearl and Company**
Dr. Babasaheb Ambedkar Road, Byculla,Mumbai –27

335. **Pharmachem International**
361, Maulana Azad Road, Mumbai – 400004

336. **Premji Haridas and Company**
Bhanushali Chambers 166-170, Sant Tukaram Road, Mumbai – 400001

337. **Quality Seeds Producer and Marketer**
Shivaji Chowk, Parabhani - 431401

338. **Saiba Industries Pvt. Ltd.**
129-131, 4th Floor, Kazi Sayed Street, Mumbai – 400003

339. **Sanjay Kumar Shankerlal and Company**
208, Surat Sadan, 88/89 Surat Street, Mumbai – 400009
Mainly Plantago ovata species

340. **Santosh Ayurvedic Drug Supply Company**
33 Daryansthan Street, Office No. 102, Majit Bhandar,
Mumbai – 400003

341. **Shree Gaanesh Aushadi Bhandar**
229, Kalbadevi Road,
Mumbai – 400002.
General Species

342. **Shreegi Ayurvedic Bhandar**
Subhash Sadan,
Chandrawarkar Road, Behind Dang Kang Chowk, Worli,
Mumbai – 400092

343. **Sidhayu Ayurvedic Research Foundation Pvt. Ltd.**
Baidyanath House, 20 Great Nag Road, Nagpur – 460009
Maharashtra.
Mainly *Saraca indica, Hemidesmus indicus,Adhatoda vasica, Terminalia arjuna, T. chebula, T. bellerica, Solanum* sp., *Andrographis paniculata, Gymnema sylvestris, Tribulus terrestris, Tinospora malabarica, Santalum album, Plumbago zeylanica, Berberis aristata, Bacopa monnieri, Cassia angustifolia* etc. and other species

344. **Sierra Enterprises**
163, Atlanta, 16th Floor,
Nariman Point,
Mumabi – 400021.

345. **Sigma Trading Company**
Nafees Chambers, 3rd Floor,
Lokmanya Tilak Marg,
Mumbai – 400001.
General species

346. **Swami Corporation**
4, Hari Niwas, C. Road,
Church Gate,
Mumbai – 400020

347. **Swastik Traders**
394, Kuth Bazar, Mamaya Chambers, Mumbai – 400009

348. **Uttam Corporation**
194, Khetwadi Main Road,
Mumbai - 400004

349. **Vishram**
306, Shaikh Menon Street,
Mumbai – 400002

MEGHALAYA

350. **Meghalaya Forest Development Corporation Ltd.**
Laoumiera, Shillong – 703001

ORISSA

351. **Babulal Sarabhai & Company**
Khariar Road,
Khariar – 766104

352. **Orissa Forest Development Corporation Ltd.**
Bhubaneshwar – 750002

PONDICHERY

353. **M/s Cottage Industries**
Shree Arvindo Ashram,
3, Rangpillay Street,
Pondicherry – 605001

PUNJAB

354. **Deepak Bawa and Company**
Majith Mandi,
Amritsar – 143001

355. **Delite**
Gandhi Gate,
Amritsar – 143001.

356. **Dinesh Gurbase Bawa Sons**
Majith Mandi,
Amritsar – 143001.

357. **Himalayan Traders**
Katra Dulo,
Amritsar – 143001

358. **Hindustan Pharmaceuticals**
Kot Mit Singh, Taran Tran Road, Amritsar – 143001

359. **Kashmir Ayurvedic**
Works, Azad Nagar,
Putlighar, Amritsar – 143001

360. **Kishan Chand Vaishno Das**
Post Box No. 119, Majith Mandi, Amritsar – 143001

361. **Krishna Kapoor and Company**
Woodlands, The Mall,
Amritsar – 143001.

362. **M/s Shivan Dittamal and Company**
Majeet Mandi,
Amritsar – 143001

363. **Mehta Pharmaceuticals (P) Ltd.**
G.T.Road, Chheherata,
Amritsar – 143001.

364. **Orient Traders**
615/VI, Bagh Jhanda Singh,
P.O.Sawarn Mandir,
Amritsar – 143001 especially Rauvolfia serpentina

365. **Raja trading Company**
Importers and Exporters
Majith Mandi,
Amritsar – 143006.

366. **Roshan Lal Sham Sunder**
50 – 51 Akali Market,
Amritsar – 143001.

367. **S. Lachhman Singh and Sons**
Katra Hari Singh,
Amritsar – 143001

368. **Vaishno Das/ Rajesh Arora**
Kishan Chand Vishno Dass,
Majith Mandi,
Amritsar – 143001

RAJASTHAN

369. **Gulab Chand Laduram**
Attar, Naya Bazar,
Ajmer – 305001

370. **M/s Mohanraj Enterprises**
151, Chetak Marg,
Udaipur – 305001

371. **M/s Satya Narayana Chandra Prakash Gandhi**
P.O.No.32, Naya Bazaar,
Ajmer – 305001

372. **Selective Fragrances India Ltd.**
Ganganagar Estate,
F-126-127, Malviya
Industrial Area,
Jaipur – 302017 Aromatic
and other Plants

TAMILNADU

373. **Abirami Botanical Corporation**
Senna and Crude Merchants
55, P.S.S. Nadar Street,
Tuticorin – 628001. Mainly
Cassia augustifolia

374. **AMK Mohammed Ibrahim Rowther**
95, Davapuram Road,
Tuticorin – 628003.

375. **Arvind Laboratories**
No. 7, Chakrapani Street,
Mambalam
Chennai – 600033.

376. **Baskar Company**
39, New Thandavaraya
Frammi Street,
Washermnpet,
Chennai – 600021.

377. **Bharati Salai**
Triplicane,.
Chennai – 600021.

378. **Crown Herbal Products**
78, Ashtabbujam Road,
Choolai, Chennai – 600112.

379. **Devi Enterprises**
25, Anjakara Street,
Dharmapuri – 636702.

380. **G.Dass and Company Pvt. Ltd.**
27 W.Great Cotton Road,
Tuticorin – 628002Mainly
Cassia aungustfolia

381. **Ganes Corporation**
New Colony,
Tuticorin – 628001

382. **General Mercantila Overseas Corporation**
314, Mint Street, P.B.7401,
Chennai – 600079

383. **Genex Corporation**
29, New Colony,
Tuticorin – 628001.
Mainly *Cassica aungustifolia*

384. **Herb and Drug India**
29, Nattukottai Chetty Street,
Tuticorin – 628001

385. **Indra Catholic Centre**
Armenian Street,
Chennai – 600001.

386. **J.K.Drug Stores**
163, Nainiappa Naik Street,
Chennai – 600013.

387. **J.K.Exports**
52, K.K.Nagar, C.I.D.Office
Corner, Madurai – 625020

388. **Jawahar Industries**
46, North Cotton Road,
Tuticorin, Mainly *Cassia Angustifolia*

389. **Jonson Enterprises Pvt. Ltd.**
34, New Thandarvalsia
Street, P.B. 905, Washerman
Street, Chennai – 600021.
Vinca rosea and other

390. **K.D. Shah Enterprises**
49/15 Sir C.V. Raman Road,
P.B.1457 Alwarpet,
Chennai – 600013.

391. **K.M.Abdul Kadhar**
145/2 Ettayapuram Road,
Tuticorin – 628002,
Mainly *Cassia Angustifolia*

392. **Kothari Phytochemical International**
766, Anna nagar,
Madurai – 625020

393. **M/s Health Aids**
24-25th Cross,Bharti Park
Road,Coimbatore – 641043.

394. **M/s Chandni and Company**
14-1-62 and 63th, mani Road,
Mattupalayam – 641301

395. **M.K.Nataraja Pillai**
49, Emperor Street,
Tuticorin – 628001.

396. **Murugan and Brothers**
78, South Raja Street,
Tuticorin – 628001

397. **Muthuswami, S.P.**
Great Cotton Road,
Tuticorin – 628001.

398. **Mutual Traders**
49, Badrian Street,
Chennai – 600001.

399. **Nadar P.P.M. Thangayaiah**
972/2 North Third Street
Pudukottai

400. **P.A.V. Sundaram**
166, New Colony,
Tuticorin – 628001
Mainly *Cassica aungustifolia*

401. **P.P.M.Thangayaiah Nadar**
South Cotton Road,
Tuticorin – 628001
Mainly *Cassia Angustifolia*

402. **P.S. Nathan and Company**
48, Auna Nagar,
Tuticorin – 628008.

403. **P.S. Sankaralinga Nadar**
50, P.S.S.Nadar Street,
Tuticorin – 628001.

404. **P.S.S.Ganeshan**
P.S.S.Nadar Street, North Cotton Road,
Tuticorin – 628001
Mainly *Cassia augustifolia*

405. **P.S.S.J. Mathan Sankar**
P.S.S.J. Suthanthira Enterprises121, North Cotton Road, Tuticorin – 628001

406. **Palanichamy, V.M.P.K.**
T.R. Naidu Street,
Tuticorin – 628001

407. **Pandian, J.R.**
North Cotton Road,
Tuticorin – 628001

408. **Pillay, S. P.M.**
Pirama Nayagam, South Raja Street, Tuticorin – 628001

409. **Poneselvan Traders**
312, South Cotton Road,
Tuticorin – 628001.

410. **Ponnu Saw Mills**
316. South Cotton Road,
P.Box 105,
Tuticorin – 628001

411. **P.S.S.Exports**
52, PSS Nadar Street,
Tuticorin – 628001 Mainly *Cassia augustifolia, Gymnema sylvestris, Azardirachta indica, Withania somnifera, Convolvulus pluricaulis, Tribulus terreatris, Vinca roseaq, Andrograpnis paineculata*, etc.

412. **R.M.K. Industries**
1 First Cross Street, United India Colony,
Chennai – 600004

413. **Saraffin International**
Kamadhenu No. 57, Bazullah Road, T. Nagar,
Chennai – 600017

414. **Satya Tara and Company**
Continental Chambers, 1st Floor, Room No. 2142
Nungambakkam High Road,
Chennai – 600034

415. **Shree Ramajayam Corporation**
50 P.S.S.Nadar Street, North Cotton Road,
Tuticorin – 628001
Mainly *Cassia Angustifolia*

416. **Solai Program**
Christianpet, N.A. District,
Katpadi – 630027

417. **Tamil Nadu Government Cinchona Department,**
Nilgiris, Post Box No. 6,
Udhagamandalam (Ooty) – 643001.

418. **Thenammal and Company**
54, P.S.S.Nadar Street,
Tuticorin – 628001. Mainly Cassia species

419. **V.S.Arulangadam and Sons**
35, Ginfactory Road,
P.O.Box 47,
Tuticorin – 628002
Mainly Cassia Species

420. **Venus Herbo Aromatics Pvt. Ltd.**
Muhavoor Road, Seithur,
Rajapalayam Taluk,
Kamarajar – 626121,
Aromatics and general herbs

TRIPURA

421. **Tripura Forest Development and Plantation Corporation**
Kanjaban, Agartala – 799001

UTTAR PRADESH

422. **Aggarwal Trading Company**
Tanakpur – 262309
(Champawat)

423. **Anrori Agro Herbo Medica (I) Pvt. Ltd.**
Post Box No. 15, Nainital – 226301, Aromatic and medicinal herbs

424. **Arun Chaurasia**
53/7 Naya Ganj,
Kanpur – 208001

425. **Arya Vastu Bandar**
46, Dispensary Road,
Dehradun – 248001

426. **Aromatic & Allied Chemicals**
B-8, Industrial Estate,
C.B.Ganj, Bareilly – 243502
Aromatic and general herbs

427. **Ayurvedic Vikas Sansthan**
C-83, Ghandhi Nagar,
Moradabad – 244001,
Aromatic and general herbs

428. **Bharat Drug Company**
50, Moti Bazar,
Dehradun – 248001
Mainly *Acorus calamus, Hedychium spicatum, Taxus baccata, Nardostachys jatamansi, xanthylum alatum*

429. **Bharat Vastu Bhandar**
47, Dhamwala Bazar,
Dehradun – 248001

430. **Brij Bhushan Lal Gupta**
Sarafa Bazar,
Saharanpur – 247001.
General herbs

431. **Chaurasia Agency**
53/20 Naya Ganj,
Kanpur – 208001.

432. **Corbet Herbs**
Penth Road, (Behind SBI), Ram Nagar, District Nainital – 263001 Mainly *Berberis* sp., *Sapindus mukorossi, Valeriana wallichii*

433. **Deepak K. Sharda**
Sharda Brothers
Ward No. 1, Tanakpur – 262309 Aromatic and medicinal herbs and products

434. **Doon Trading Company**
Panditwari, P.O.Premnagar
Dehradun –248007.

435. **Doon Trading Corporation**
Panditwari, Post Prem Nagar
Dehradun – 248007.

436. **Durga Singh Martolia**
Village Bala (Magar), Post Madlakya, Pithoragarh – 262501 Himalayan herbs

437. **Himalaya Drug Company**
Saharanpur Road, Clement Town, Dehradun – 248002.

438. **Himalaya Herb Stores**
Madho Nagar, P.B. 130
Saharanpur –247001

439. **Indian Herbs Research and Supply Company**
Post Box 5, Sharda Nagar
Saharanpur – 247001
Trade in *Emblica officinalis, Terminalia arjuna, T. bellerica, T. chebula* etc.

440. **Jagdish Narayan Hari Mohan**
Tanakpur –262309, District Pithoragarh

441. **Khattri Sandal Wood Oil & Essential Oil Distillaries**
Talwaran Road, Kannauj, Farrukhabad – 209725
Aromatic and medicinal herbs

442. **Krishna Pharmacy**
Haridwar Road, Kankhal, Haridwar – 249404.

443. **M/s Laxmi Exports**
Laxmi Villa, 20 Pretam Nagar Sulem Sarai, Allahabad –211001

444. **M/s M.L.Ramnarayan**
Kothi Lala Ramnarayan, M.G.Road, Kannauj –226001

445. **M/s Perfumes (India) Pvt. Ltd.**
Nanpara House, B.N.Road, Lucknow –226001.

446. **Magn Lal and Company**
Palton bazaar, Dehradun – 248001, Himalayan herbs

447. **Mahesh Trading Company**
360/127, Mata Din Road, Sahadat Ganj, Lucknow –226001

448. **Meghdoot Gramoudhyog Sewa Sansthan**
Meghdoot Building, Chandan Ganj, Lucknow – 226001

449. **Mukt Prasad Rameshwar Dayal**
Ramnagar – 244714, District Nainital

450. **National Trading Company**
Darshni Gate, Dehradun – 248001.

451. **Padam Prakash Anil Kumar**
Kawari Bazar, Saharanpur – 247001

452. **Parvatiya Sahkari Bhesaj Vikas Evam Karya Vikraya Sangh**
Pithoragarh – 262501

453. **Pharmaceutical Crude Drug Enterprises**
Kosi Raod, Opposite State Bank, District Nainital, Ramnagar – 244715.

454. **Pannalal Brijlal**
Their House,
Haridwar –249404.

455. **Prabhat Herbs**
Latowali, Kankhal,
Haridwar – 249404

456. **Prashant Traders**
Kankhal, Haridwar – 249404

457. **Raj Kumar Gupta**
Village Bikaman Khurd,
Indaura Bagh,
Lucknow – 226001

458. **Ratan Lal & Sons**
G.B. Pant Marg (Udham Singh Nagar)
Tanakpur –262309.

459. **Rameshwar Kisan Gopal**
Naya Ganj,
Kanpur – 248001.

460. **S.K.Dutta and Company**
215 Old Dalanwala,
Dehradun – 248001

461. **Sahkari Vikas Sangh Ltd.**
Gopeshwar – 246001
District Chamoli Garhwal

462. **Shivalik Jadi Booti Bhandar**
Purani Mandi Chowk, Near Miglani Building,
Saharanpur – 247001

463. **Shivnath Khairatilal**
Moraganj,
Saharanpur – 247001

464. **Surya Pharmaceuticals**
N-1/69, B.Krishna Bagh,
Nagwa, Varanasi – 821005,
Mainly *Asparagus recemosus, Andrographis paniculata, Convolvulus pluricaulis, Centella asiatica, Withanai somnifera, Nardostachys jatamansi, Solanum* sp., *Saussurea lappa, Saraca indica, Aloe wera, Bacopa monnieri, Boerhavia diffusa* etc.

465. **Vardman Oushdhi Bhandar**
Near Employment Office,
Ajadpur Lalitpur – 284403

466. V.V.General Traders
1, Sutharashahi Kundanpura
Muzaffarnagar – 251002

467. **Vijay Laboratories Pvt. Ltd.**
First Floor, Raj Hotel Building, Aminabad Park,
Lucknow – 226015

468. **Vinay Aggarwal Ratanlal and Sons**
GB Pant Marg,
Tanakpur – 2622309

469. **Vishal Traders**
Sahadat Ganj,
Lucknow – 226003

WEST BENGAL

470. **Adcco Ltd.**
P.O.Adcconagar, District
Hoogli – 712121

471. **Ahmed Ali Jafferjee Gandhi**
24 Pollock Street,
Calcutta –700001.

472. **Aman Impex Pvt Ltd.**
14 Roop Chand Street,
Calcutta – 700007

473. **Arun and Company**
Arun Chamber, P-38 Indian
Exchange Place,
Calcutta – 700001.

474. **Aurora Export Trading Agency**
6-A, 3rd Floor, Saklat Place,
Calcutta- 700072

475. **Beharilal Hemraj**
176 Jamunalal Bajaj Street,
Calcutta – 700007.

476. **Bhartia Sons Ltd.**
12, Government Place East,
Calcutta – 700069.

477. **Directorate of Cinchona and other Medicinal Plants**
10/1A, Indian Mirror Street,
Calcutta – 700013
Mainly *Cinchona*,sp. and
other general herbs

478. **Duncans Agro Industries Ltd.**
31. Netaji Subhas Road,
Calcutta – 700001.

479. **Eastman and Company**
3, Southern Avenue,
Calcutta – 700026.

480. **Excel Drug House**
18-B, Sukeas Lane,
Calcutta – 700001.

481. **Expo. International**
Exporters and Suppliers
20, Old Court House Street,
Calcutta – 700001.

482. **Gemini Cosmetics**
104/1, Sarsuma Main Road,
Calcutta – 700061.

483. **Giya Exports**
60, Sir Hari Ram Goenka
Street, Calcutta – 700007.

484. **Global Export Pvt. Ltd.**
55 Stephan House, 4B B-D,
Bagh East, Calcutta – 700007

485. **Hiralal Gajdarilal**
24, Maktaram Babu Street,
Calcutta – 700007

486. **Indian Drugs (Crude)**
Distributers,12-B, Clive
Row, P.B.2836,
Calcutta – 700001

487. **Indian Marine Services Pvt. Ltd.**
6/1, Lurdsay Street,
Calcutta – 700016.

488. **Indo World Trading Company Ltd.**
10 Armanian Street,
Calcutta – 700001.

489. **Jai Trading Corporation**
11, Brabourne Road,
Calcutta – 700001.

490. **Jiwanram Sheoduttrai**
Block D, Chowringhee
Mansion, 30 Jawaharlal
Nehru Road,
Calcutta – 700016.

491. **Kanilal Ram Kumar**
178, Harrison Road,
Calcutta – 700007.

492. **Krishna Traders**
20, Harichandra Mullick
Street, Calcutta – 700005

493. **M/s Aldrich International**
216/2-A Aacharya J.B.Road,
Calcutta – 700017

494. **M/s Aman Impex Pvt. Ltd.**
14, Roop Chand Rai Road,
Calcutta –700007.

495. **M/s Radharam Sohanlal**
3, Malik Street
Calcutta – 700007.

496. **M/s S.K. Mundra**
48, First Floor, Netaji
Subhash Road,
Calcutta – 700001.

497. **M. S. Vawada & Company**
6-7 BRBB Road, Canninig
Street, Calcutta-700001

498. **Madhura Industries**
107 Rippon Street,
Calcutta-700016

499. **Merchant and Traders Pvt. Ltd.**
32, Armencences Street,
Calcutta-700001

500. **Miller & Company Pvt. Ltd.**
24, Netaji Subhash Road,
GPO Box 2567,
Calcutta-700001

501. **Minex Agencies**
71 Ganesh Chandra Avenue
Calcutta-700013

502. **Mire Traders**
Amber Tala Street
Calcutta-700001

503. **Organon (India) Ltd.**
Himalaya House, 38
Chowranghee Road
Calcutta-700016

504. **Pharma Impex**
10, Middleton
Calcutta-700071

505. **Pharmachem International**
8 Camac Street,
Shantiniketan
Calcutta-700017

506. **Radharam Sohan Lal**
3, Mallik Street,
Calcutta-700007

507. **Robinsomar & Company**
2, Mission Raw Extension,
Calcutta-700001

508. **Shiba Pada Kunda & Sons**
168-B, Cotton Road,
Calcutta-700023

509. **Simlipahar Forest Development Corporation Ltd.**
Calcutta-700012

510. **Tolaram India Ltd.**
68, Nalini Sett Road,
Calcutta-700070

511. **Universal Carbon Company**
46, Ezra Street,
Calcutta-700001